

SUPPLEMENT

TO

THE MEDICAL JOURNAL OF AUSTRALIA

SYDNEY, SATURDAY, FEBRUARY 16, 1924.

TRANSACTIONS

Australasian Medical Congress (British Medical Association),

First Session : Melbourne, November 12 to 17, 1923

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The first session of the Australasian Medical Congress (British Medical Association) was opened by His Excellency the Governor-General of Australia on November 12, 1923. The meeting was held in the Wesley Church, Collins Street, Melbourne, instead of at the Melbourne Town Hall, on account of the difficulties arising from the police strike during the previous week. The platform was occupied by His Excellency, Lord Forster, The Acting Prime Minister (Dr. Earle Page), the Premier of Victoria, the Lord Mayor of Melbourne, the Honourable Dr. S. S. Argyle (Minister of Health of Victoria), Mr. G. A. Syme (President of Congress), Sir William Macewen (Past-President of the British Medical Association) and Dr. F. Antill Pockley and Dr. A. C. Purchas (Past-Presidents of the Australasian Medical Congress).

His Excellency the Governor-General, in declaring the Congress open, dealt with the preventive aspect of medical science and made special reference to the small percentage of the population who were physically fit. When war broke out, they had learned this fact. He paid a graceful tribute to the medical profession, more particularly in regard to the immense amount of work which was done freely and without remuneration. He wished the members success in their undertakings.

Mr. G. A. Syme, President of Congress, welcomed Sir William Macewen as representative of the great organization that had taken over the Congress. He took the opportunity of thanking the Council of the British Medical Association for having acceded to the request of the Executive Committee to induce Sir William to travel half-way round the world to attend the first meeting of the Congress under the auspices of the Federal Committee of the British Medical Association in Australia.

President's Address.

By G. A. SYME, M.S., F.R.C.S. (England),
President of the Australasian Medical Congress
(British Medical Association).

It is now my duty, an obligation imposed by the constitution of the Congress, to address to you some remarks on more or less professional topics. On an occasion like this many minds will naturally revert to the last meeting of Congress held in Melbourne and will recall the masterly presentation then given of the collective *mens medica* by my distinguished predecessor in this chair, Professor Sir Harry Allen.

It may be remembered that in his eloquent and erudite address, he observed that "in general terms the medical profession has for its special function the culture of human life." Taking this sentence as the keynote of what follows it may be convenient at the outset to point out that the subject matter falls into two groups, firstly, matters which are

purely professional, and secondly, some which are rather socio-political, but in which the profession claims to have a special interest, such as eugenics, euthanasia and the like; opinions expressed on this second group are not to be regarded as authoritative but merely suggestive.

Probably never was a time in history when the culture of human life was more necessary or more important than now, in the period following the Great War.

It has long been argued on the platform and in the press that one of Australasia's greatest needs is more population. The war has accentuated this need, owing to the loss by actual death or by permanent disablement of so many of the most virile and most productive in the community.

In the immigration schemes that have been instituted to provide more population, it has been recognized that undesirable people must not be admitted to the Commonwealth. It is not equally appreciated by those whose slogan seems to be "multiply the people to fructify and defend the country," that the natural increase of population also must be safeguarded; that it should be qualitative, and not merely quantitative. To add to the population those who cannot or will not work, is positively harmful. Incapacity for work is largely due to impaired physical conditions, inherited or acquired. If production is to be increased, in order to restore the economic loss occasioned by the war, it is essential that the whole population must be in the best possible condition of health and so able to work with the greatest efficiency. In short, the culture of human life must be promoted in every possible way.

Everyone is impressed by the dramatic wastage of war, but the constant wastage of disease, though far greater, is accepted with fatalistic resignation, as if it were inevitable. But it is not inevitable; a great deal of disease could and should be prevented. Why, then, is it not prevented? Who is to blame? A section of the lay press, especially in the State of Victoria, seems to imply that the medical profession is chiefly in fault. The following quotation from a leading article in one of our newspapers indicates its attitude:

Practically the whole of our health service is in the hands of the medical profession, that is constituted as a monopoly of private traders. The private doctor is not concerned with health at all. He is only concerned with ill-health. His services must be bought for high fees. He is not called in until illness is manifest. His whole business then consists of curing the illness or alleviating the suffering and collecting his fee. Causes that may infect others, sources from which disease may spread throughout the community, conditions that must inevitably mean ill-health—these are altogether outside the scope of his profession. National health can never be improved by relying upon a profession of curers.

Such a statement, while containing some truth, is obviously unfair. The medical profession all the world over has ever been in the forefront of all movements for the prevention of disease, most of which have been originated and inspired by its members. It is true that the ordinary general practitioner in the past has been more directly concerned with the

treatment of actual disease than with its prevention, but that is because disease has always been present and required treatment and curative work has necessarily taken up the largest proportion of the time and energy of the ordinary practitioner. It is for this work that he had to be trained. In all occupations specialization has been necessary, because no one individual can be master of every department. The prevention of disease has been made a special department of medicine, in charge of members of the profession who give their whole time to their duties, as officials of the public service. The field of specialization in this direction is ever widening and more and more medical practitioners are enlisting in community service, either as whole-time or part-time public officers. Every conscientious practitioner does help in the prevention of disease as far as opportunity offers. It is, however, true that in the past general practitioners might have had more training in the preventive aspects of medicine, might have cooperated more satisfactorily with the public health officials and might have adopted a more sympathetic attitude to their work.

The General Medical Council of Great Britain decided recently "that throughout the whole period of study the attention of the student should be directed to the importance of the preventive aspect of medicine" and, as the Council regulates medical education in all the British Dominions, we may be confident that all future practitioners will be properly equipped to fulfil all their obligations in regard to prevention of disease. That the profession is deeply impressed by the great importance of prevention is indicated by the decision of the Executive of this Congress that "in all the work of the Congress particular attention shall be given to the preventive aspect, including medical research."

In July, 1919, the Federal Committee of the British Medical Association in Australia resolved:

That a material advance will have been made in the practice of public health when the practising profession, who come first into relationship with cases of illness and who can earliest take adequate measures, have become incorporated as an integral part of the machinery of public health.

In February, 1920, the Committee further resolved:

That it is highly desirable that a Commonwealth Department of Public Health be created.

These resolutions were submitted to the Prime Minister and the Commonwealth Department of Public Health was subsequently established. The profession hoped that this department, in conjunction with the State Departments of Health, would have formulated some scheme for the practical co-operation of the general practitioner in preventive medicine. The Federal Committee has indicated the views of the profession on the subject and is engaged in preparing suggestions for the necessary organization. It should be the function of departmental experts to devise the machinery. The profession will consider most sympathetically any scheme that is proposed.

No. Ladies and Gentlemen, it is not the medical profession that is chiefly to blame because disease is not prevented. It is the public, individually and collectively, that is mostly at fault. Members of the profession are ceaselessly striving to educate the public as to the supreme importance of health and as to the proper measures necessary for maintaining good and avoiding ill-health. The members of the public cannot be persuaded for their own good to adopt these measures, even when most obvious.

Venereal Diseases.

For instance a very prevalent disease in every community is that called venereal. Exactly how prevalent it is difficult to say. In Australia it has been estimated that 30% of the population is affected by it and that the economic loss it occasions is £50,000,000 *per annum*. The scientific researches of medical practitioners have discovered the exact organisms that cause the diseases, the methods of infection, special tests for their presence in individuals and specific remedies for their cure. The profession has made its discoveries public and, largely owing to its representations, parliaments in Australia and elsewhere have enacted laws dealing with the subject. The disease ravages the community just the same, causing infinite misery and suffering to thousands of innocent people, including children. Why? Because individual members of the public will not make use of the knowledge given them, will not obey the law, will not exercise self-denial and self-control and refrain from certain practices. Almost from time immemorial these practices have been denounced by ethical and religious authorities as immoral and sinful. Yet in spite of Church, Law and Medicine, such is human nature, that these practices continue and as human nature changes very little, it is not probable that they will ever cease. In endeavouring to prevent venereal disease, however, purity, chastity and continence must always be the ideal at which all must aim.

Typhoid Fever.

In the prevention of typhoid fever much has been accomplished because it has been more a matter for corporate than for individual action. For example, in Melbourne in 1878 typhoid fever caused three hundred and seven deaths. In 1922 only twelve died and in the last nineteen and a quarter years only 8.5 cases occurred per thousand of the population.

In 1885 a Royal Commission investigated and reported on the sanitary condition of Melbourne. It recommended the establishment of a Metropolitan Board of Works to institute a system of sewerage and other improvements. Parliament carried out its recommendations; the results indicated followed.

While both the incidence and death rate of typhoid fever have fallen so markedly in the metropolis, the disease still occurs with excessive frequency in country and extra-urban districts. The incidence of the disease per thousand inhabitants for some Victorian towns in the last nineteen years was:

Bendigo 56, Mildura 83, Swan Hill 193, Murchison 45, Echuca 74½, Beechworth 92, Wangaratta 73, Mansfield 64. In March of this year a severe outbreak took place at Mordialloc, a seaside resort near Melbourne, but unsewered. Water supply and sewage schemes on a large scale may not be practicable in country districts, but that is no reason why nothing should be done. Drainage should be diverted from rivers and discharge of filth into streams stopped. The methods of water purification and sewerage treatment adopted so successfully in the armies during the war, show what can be done and what is the effect of such measures in reducing typhoid fever. In the South African War typhoid fever caused ten thousand deaths. In the Great War only two hundred and sixty-six died from this disease. The measures used in the war could and should be adapted to civil requirements. Another factor in reducing both the incidence and mortality of typhoid fever in the war was compulsory protective inoculation. This valuable method should be employed in peace as in war, especially in country and extra-urban districts.

Propaganda work is necessary to arouse interest in disease prevention in rural districts, where the need of communal effort seems less appreciated than in large centres. The proposal of the Director-General of Health of the Commonwealth to establish health services in selected areas should be adopted. The service would be under the administrative control of a skilled expert, who would secure the cooperation of the general practitioners of the district, the local health authorities and sanitary engineers. They should all be apostles of hygiene and go forth with the zeal of the old Crusaders.

Diphtheria.

While the case mortality of diphtheria has been reduced by the employment of antitoxin in treatment, the incidence is higher than ever, so that the actual death rate has greatly increased. In 1911 the deaths in Australia were 362, in 1922 they were 522. One of the difficulties in the prevention of diphtheria is the problem of the "carrier." The identification of "carriers" has been established in diphtheria, cerebro-spinal meningitis and typhoid fever. They are probably responsible for the spread of infantile paralysis, *encephalitis lethargica*, influenza, measles and scarlet fever.

The Commonwealth Department of Health has instituted an anti-diphtheria campaign at Bendigo. The results will be submitted to this Congress, in its Public Health Section. It is understood that they are very gratifying. In April, 1921, a similar campaign was undertaken in Toowong with the following result. Five hundred and thirty children were examined; ten carriers were discovered and isolated. From January 1 to April 30, 1921 (prior to the campaign) fifty-eight cases of diphtheria occurred; from May 1, 1921, to July 31, 1922, only sixteen cases.

To the Public Health Section will also be communicated the results of an investigation into the

"Schick test" and as to the possibilities of immunizing, by protective inoculation, children shown by the test to be susceptible.

This method has been in use in America for some years and Dr. W. H. Park, of New York, states that three injections of one cubic centimetre each of a suitable toxin-antitoxin mixture, spaced one or two weeks apart, will cause about 85% of susceptible children or older persons to cease yielding a Schick reaction and will produce considerable, if not absolute, protection against diphtheria. The duration of the immunity in at least 90% of the children is for more than six years and probably for the remainder of life. No serious effects have ever resulted from the injections, given to tens of thousands of New York children in the last seven years.

When the Health Officer for Colac asked the Health Commission in Victoria a short time ago to organize a campaign there for "swabbing" throats of "suspects" and eliminating "carriers," the Commission refused and said such a scheme was impracticable, chiefly because of its cost. The prevention of diphtheria is admittedly a difficult problem and its solution means considerable expenditure. But it ought to be the business of health authorities, like the Commission, to make governments and people appreciate that health and safety cannot be secured without heavy expenditure. They must also be taught that money so expended will be well spent and truly reproductive, by promoting efficiency and reducing economic loss.

Research into the Causes of Disease.

Australia has been saved considerable expenditure by the generous assistance of the International Health Board of the Rockefeller Foundation. We are under a deep obligation to the Board and cannot too heartily express our appreciation of the service it has rendered. The trained experts it sent us have conducted most valuable investigations with very practical results. But why should a prosperous country like Australia have to be indebted to America for funds for work of this kind? It is a great reproach that more of our wealthy Australians do not contribute funds for research. The Executive of this Congress has decided, as previously mentioned, that in "all its work particular attention shall be given to the preventive aspect, including medical research." The necessity for research and for providing facilities for carrying it on cannot be sufficiently emphasized. Melbourne is fortunate in possessing the Walter and Eliza Hall Institute, by means of which excellent work has been done. In Sydney the Royal North Shore Hospital is to be provided with a research laboratory, partly by Government and partly by private beneficence. The Commonwealth Department of Health has established laboratories at Bendigo and Townsville. Similar institutions are needed all over Australia and every large metropolitan hospital at least ought to have a research laboratory with a staff of trained scientific experts. As Sir Almroth Wright observed recently, most of the research work in medicine can

only be done in connexion with hospitals which provide problems and material. Scholarships should be provided for training students in research. Such students as are found suitable should then be given permanent posts. Those engaged in medical research are constantly tempted to desert and engage in private practice, owing to its greater monetary rewards. To prevent this they must be given adequate salaries and proper status.

Our ignorance regarding the real causes of disease is immense and until the mode of origin is discovered, little can be done in the way of prevention. One of the commonest diseases today is appendicitis. Like a bolt from the blue it suddenly attacks an apparently healthy individual and no one seems to be immune. Every practitioner sees innumerable cases, but no one has discovered how any case originated; the bacteriologist has not even found a specific organism that can be held responsible. Even when the specific organism is known, as in pneumonia, which attacks as suddenly and mysteriously, the profession is still ignorant of the other factors essential to its causation and unable to advise measures of prevention.

Another class of disease concerning the origin of which little is really known, is that characterized by the formation of calculi, whether in the urinary, biliary, salivary or intestinal tracts. Pathologists speak about altered metabolism, but the phrase is often only a cloak for ignorance, as it is when applied to the cause of gout and other constitutional diseases. In diabetes again, metabolism is deranged and much valuable research has been carried out to elucidate its nature and provide a remedy. The highest honour is due to Banting and his associates at the Toronto school, for their magnificent work in isolating and preparing "Insulin" and demonstrating its value in treatment. Their work is a splendid example of the practical value of scientific research and also of the necessity of research laboratories being connected with hospitals. But notwithstanding all that has been done in showing that diabetes is dependent on changes in the islets of Langerhans in the pancreas, it only takes us a step further back; we are still ignorant as to the causes of these changes and as to any means of prevention.

A more profound mystery is the cause of tumours, whether innocent or malignant. They occur not only in man, but in animals and the vegetable world. Possibly investigations in comparative pathology, a somewhat neglected field, may help to enlighten the darkness.

Until more is known as to the mode of origin of such conditions, prevention of their occurrence is almost impossible. All that can be done is to prevent their baleful effects. In this connexion it must be borne in mind that much so-called merely curative procedure is also preventive. When a surgeon removes calculi, tumours or an inflamed appendix, he does so largely to anticipate evil results. Done in an early stage the operation itself is perfectly safe, while by doing it, dangerous and often fatal compli-

cations or sequelæ are prevented. At the same time the patient is relieved of the actual symptoms present, especially pain. To the patient pain is the all important evil for which he seeks relief; to the profession it is a valuable sign of warning—a blessing in disguise. If appendicitis, for instance, were painless, its mortality would be terrible.

One reason why cancer often becomes so firmly established as to be practically incurable is that, except occasionally in its last stages, it is generally painless. The public unfortunately thinks it ought to be very painful and because there is no pain, does not seek advice until too late. Often also when it attacks internal organs, it produces very few symptoms until well advanced. Cancer of the lip and face is said to be less malignant than in other parts, but is it not rather that there it is visible and recognized earlier? As to treatment, early and radical operation still holds out most hope, combined with radio-therapy before and after operation. The essential is early diagnosis.

It cannot be too strongly impressed on the public and also on general practitioners that every abnormality in the shape of lumps and sores, especially lumps in the breast and sores on the lips, tongue and mouths should receive prompt attention. All women should frequently examine their breasts for lumps and should also know that bleeding after the menopause, indeed all uterine hæmorrhage, demands investigation. So-called indigestion in elderly people coming on suddenly and especially if accompanied by loss of weight is always suggestive of cancer of the alimentary canal, just as piles appearing late in life, or what is thought to be piles, often indicates rectal cancer and always requires attention.

At a meeting of the Royal Society of Medicine in London in March last the urgent need for public education on the subject of cancer was discussed and it was resolved:

That it is desirable that the public should be given more information as to the early signs of cancer and the prospects of cure by immediate treatment.

As a result a body was constituted called the British Empire Cancer Campaign which is appealing for monetary support from the whole Empire. The British Red Cross Society has placed its organization at the disposal of the Council of the Campaign, the object of which is to coordinate and support research in cancer throughout the Empire.

In America a society has existed since 1913 for the control of cancer. Its objects are to disseminate knowledge about cancer, investigate conditions under which cancer is found, and compile statistics. Information suitable to public understanding is given by means of pamphlets, posters, films and lectures. A similar publicity campaign should be instituted in Australasia and strong financial support given to the British Empire Campaign.

Pure Air and Sunlight.

As a result of want of definite knowledge as to the exact mode of causation of so many diseases it is

difficult for the profession at present to give much help in their direct prevention. We have to rely on general principles for promoting good health. These principles are few and simple. They can almost be summed up in one word—purity; pure air, pure water, pure food and pure surroundings. The dweller in a modern city generally gets fairly pure water supplied by some corporate body and can always make the water safe by boiling and filtering. Existing laws against adulteration ought to insure pure food, while the systems of sewerage and scavenging in use should provide fairly pure surroundings, provided the householder is cleanly. But he does not get pure air. The atmosphere of large cities is impregnated with smoke and dust which is often germ-laden. The modern practice of living in flats and tenements is objectionable because the tenants get insufficient fresh air and sunlight. The Medical Research Council made an inquiry recently in the London County Council schools as to the relative capacities of children from independent homes and those from flats and tenements. It was found that the former were 33.3% better.

It has long been known that sunlight has a powerful effect in rendering pathogenic organisms inert. More recent researches show that it also has a most beneficial effect on nutrition. Absorbed into the organism it hastens intra-cellular processes of oxidation and reduction and favourably modifies metabolism. Investigations carried out by the Lister Institute show that absence of sunlight or more particularly its ultra-violet rays is a factor in the production of rickets. These rays enable the body to deal economically with certain specific food constituents or vitamins whose absence from the food is one factor in causing rickets.

The principle of municipal taxation on unimproved land values, in force in many residential suburbs, seems objectionable from a health point of view, leading to restriction of free spaces round dwellings and diminishing the amount of sunlight and pure air. It also lessens the opportunities for gardening, a most healthful recreation.

Infantile Mortality.

One of the best means of increasing an effective population is to reduce infantile disease and mortality. In Australia in 1920 the deaths of children under one year of age numbered 7,251 and from one to five years, 2,394—which is far too many. In New Zealand infantile mortality has been much reduced and is now the lowest in the world. Much of the improvement must be credited to the Plunket System, though other factors contributed. It may be noted that the Plunket System was devised by Dr. Truby King, a member of our profession and of this Congress, who has done very much to make the system a success. Its main features are to encourage breast-feeding of infants and by the service of specially trained nurses to teach mothers how to feed their children properly and how to attend to them.

It is to be hoped that some scheme of similar

character will be put into effective and universal operation in all the States of Australia. It need not be identical in all respects, but might be modified to suit peculiarities of climate and situation.

It is regrettable that in this work for infant welfare there is so much overlapping, so many societies aiming at the same object in different ways. The Health Department of the Commonwealth might perhaps try to coordinate these various agencies in some national scheme which would also include pre-maternity care of prospective mothers and obstetric and post-maternity care also. Some of the money distributed by the Commonwealth Government as maternity bonus might be much more effectively used in fostering methods of the kind indicated.

Maternal Morbidity and Mortality.

The morbidity and mortality of child-birth are still far too high. As one means of lowering them some modern obstetricians seems to have been fascinated by the glamour of operating. One authority reported, apparently with pride, that out of 1,113 deliveries he had 920 versions, 80 Caesarean sections and 39 forceps cases. While some regard such practice as meddlesome midwifery and a contradiction in terms of the function of the obstetrician, "one who stands by," those who advocate such measures, claim that they are truly preventive in nature. It is to be feared that the subject of practical obstetrics is not now a sufficiently important part of the medical curriculum and, apart from its operative side, does not appeal to the student as it should. Dr. Barrington, of Sydney, has drawn forcible attention to the urgent need for more practical instruction in obstetrics and Professor Watson in his Inaugural Lecture at Edinburgh recently, also urged the necessity of more thorough and intensive training in this subject. Sir George Newman in his recent "Memorandum on Medical Education" outlined a scheme of instruction which includes all that Drs. Barrington and Watson demand, with the addition of clinical work in female venereal wards. "Midwifery," he said, "should be taught at the bedside just as medicine and surgery are." In all obstetric teaching the preventive aspect must be emphasized. To insure the safe delivery of a living child and that the mother shall not suffer any preventible damage at the time or later, expectant mothers must be convinced of the necessity of consulting their medical advisers at an early stage of their pregnancy, at intervals during it and also after confinement.

Mental Deficiency.

In all endeavours to increase population it must be remembered, as stated at the outset, that what is essential is efficiency and not mere increase of numbers. To multiply the unfit is a national calamity. Unfortunately the unfit breed much more rapidly than the fit. Dr. Barr, physician to the Pennsylvania Training School for Feeble-minded, has stated that mental defectives reproduce their kind from two to six times more rapidly than normal people.

In this connexion the investigations and views of

Professor Berry, made public in his Stewart Lectures, demand serious consideration and action. As he pointed out an urgent need in Australia is the establishment of child-study clinics, for the scientific investigation of children and the segregation and special treatment of those found to be defective.

Like begets like. "Thou didst prevent me; I had peopled else this Isle with Calibans." The children of defectives are mostly themselves defective. The well-known case of the Kallikak family illustrates how heredity operates. A young soldier of good stock had a son by a feeble-minded girl, from whom have descended in a direct line 480 individuals, of whom only forty-six are known to have been normal; of the rest some are unknown, the others turned out to be feeble-minded, alcoholic, epileptics and criminals; the women were grossly immoral, mostly prostitutes. Later the soldier married a woman of good family who bore several children and all the descendants turned out well, many being distinguished. The two families lived in the same environment. The case of the Jukes family is perhaps better known. Two sons of a mentally defective man married degenerate sisters. In the year 1915 their descendants numbered 282 individuals, scattered widely over the country. They all showed every grade of viciousness, pauperism, criminality, idiocy and insanity and were estimated to have cost the State two and a half million dollars.

One method of preventing the multiplication of defectives is the sterilization by surgical means (vasectomy in the male and tubectomy in the female) of those who are obviously unfit to produce normal offspring. Such a procedure is vigorously opposed, chiefly on sentimental grounds or because it is regarded as undue interference with the liberty of the subject. It seems, however, on biological evidence one of the most scientific and rational methods of preventing some of the economic loss and social disaster produced by the rapid multiplication of the unfit. Luther Burbank who has done such wonderful work in creating new varieties in the vegetable world, stated recently that: "Nothing seems more certain than that such civilization as we have, poor as it is, will be destroyed unless means can be taken to prevent the unfit from multiplying so rapidly that they swamp and overwhelm the fit." The Dean of St. Paul's also has drawn forcible attention to the dangers that threaten us from this source. He, like Burbank, believes that the future of civilization is at stake, if measures are not taken to counteract the evil.

It is not claimed that sterilization of the unfit would abolish mental deficiency, because many mental defectives are not the direct result of hereditary factors. Neither is it suggested that it is the only measure required. Segregation and restraint with proper care and training are necessary, which may improve but can never cure the unfortunate condition. No training can restore the missing brain cells. Further, the care must be for life. It is fatal to train defective children to the age of eighteen or twenty-one and then let them loose on society.

Neither is it recommended that surgical sterilization should be enforced by law, except perhaps in the case of those moral defectives who are convicted of sexual offences, on whom not vasectomy but orchectomy should be performed. In several States of America laws have been enacted for the sterilization of "idiots, imbeciles, rapists and confirmed criminals." In some States these laws have been subsequently repealed; in others, it is stated, they are a dead letter. The time is not ripe for such measures, but voluntary sterilization with the consent of all concerned, as introduced into Switzerland fifteen years ago, could and should be tried. That the medical profession is awakening to the importance of the problem is indicated by the prominence given to the discussion on "mental deficiency in its social aspect" at the meeting in July last of the British Medical Association in Portsmouth. It is, as one speaker said, "part of the responsibility of the medical profession to see that these problems are faced."

Euthanasia for cases of hopeless and painful disease is another measure to which public sentiment objects. Surely it is both rational and humane to end a useless and painful existence which is nothing but misery both for the sufferer and for the relatives and friends.

Of course, both sterilization of the unfit and euthanasia must be provided with proper legal safeguards and their application may involve difficulties.

Medical Curricula.

The temptation to discuss medical curricula is great, but must be overcome. All our Australian Universities have recently revised their medical curricula and time must be allowed to see how they succeed. The only criticism that may be offered, is that tradition has still too much influence and the dead hand of the past holds too much power. Some of the knowledge still demanded might be abolished to make room for new subjects of greater importance.

Medical Terminology.

Might one venture also to put in a plea for simplification of medical terminology? Much of it is hybrid and uncouth and it is often lacking in uniformity. For instance, perityphlitis was a suitable Greek word coined to indicate inflammation round the blind end of the large bowel. When it was found that the symptoms of perityphlitis were due to inflammation of the *appendix vermiformis caeci*, Latin for the worm-like appendage of the blind bowel, the disease was given the hybrid and ugly, but now familiar name of appendicitis. Inflammation of the peritoneum is rightly called peritonitis, but why is inflammation of the lung called pneumonia and of the pleura, pleurisy? We speak of leucocytes, but how many call the red cells erythrocytes? Students and practitioners talk glibly of phagocytes, opsonins and anaphylaxis, but how many know their literal meaning?

The "new psychologists" are responsible for

coining a number of terms hardly comprehensible by the uninitiated. A famous statesman once referred to an equally great rival as "inebriated by the exuberance of his own verbosity." Some of the disciples of the new psychology might be regarded as hypnotized by the unintelligibility of their own jargon.

This is not to be regarded as a denunciation of the new psychology itself. Only those who have carefully studied the subject, can justly criticize.

It must be fully admitted also that practitioners of medicine must not neglect any method, such as that of psycho-analysis, that may help in either diagnosis or treatment, nor should they allow them to be exploited by the laity. But when the late Dr. W. H. R. Rivers, a truly scientific and universally recognized authority on the subject, challenges the soundness of the new theories in many respects and when a leader so eminent, so revered and so representative as Sir Clifford Allbutt denounces them as "false science," the rank and file may hesitate to accept all that the new psychologists claim until their views have been subjected to further very careful and truly scientific research.

The Philosophy of Medicine.

Research! That is the keynote of progress. If we "glance into the dark backward and abysm of time" we shall see that medicine arose out of credulity and superstition. The ancient priest and medicine man used incantations and charm. Steadily, if very slowly, medicine has evolved as a science, broad-based on the other physical sciences and on research. It has changed, as Sir Clifford Allbutt has said, "from a craft of tradition and sagacity to an applied science of analysis and law; from a descriptive code of surface phenomena to the discovery of deeper affinities, from a set of rules and axioms of quality to measurements of quantity." The evolution is still going on and is very far from complete. Our limitations are great. The unknown is immense. But year by year the circle of limitation is widened. The area of the unknown narrowed.

Rolland has well said: "The essence of man lies in his marvellous faculty for seeking truth, seeing it, loving it and sacrificing himself to it." We look especially to the young to carry out this search. As Rolland further said: "Old people must learn from the young. They have profited by us and are ungrateful; that is in the order of things. But, being enriched by our efforts, they will go further than we. They will realize what we attempted. It is splendid to see this perpetual, new flowering of the human soul, the vigorous optimism of young people."

Mr. Bernard Shaw in his play "Back to Methuselah" suggested that the span of human life ought to be extended and Dr. Leonard Williams recently maintained that, if the average life of the lower animal is estimated in relation to the time taken to reach maturity, the normal life span of man ought to be from one hundred and twenty to one hundred and forty years. Metchnikoff alleged that

on a sour milk dietary man might live to one hundred and eighty.

Professor Osborne, of Melbourne, on the other hand has given physiological reasons why much increase of longevity cannot be expected and has pointed out that unless the physical apparatus of memory can be greatly increased, the span of life must remain much as it is. A. R. Wallace maintained that death was advantageous by preventing overcrowding with the aged and incompetent.

Remember Kipling's "Song of the Old Men":

This is our lot if we live so long
And labour unto the end
That we outlive the impatient years
And the much too patient friend;
And because we know we have breath in our mouth
And think we have thoughts in our head,
We shall assume that we are alive
Whereas we are really dead.

Would it be desirable, even if it were possible, to increase the span of life, unless youth could be retained as well? Nearly all the best work in the world has been done by the young. Most of its poets, artists, scientists, soldiers, explorers and navigators achieved their greatest success in youth.

The researches of Steinach and the experiments and operations of Voronoff, however, suggest that not only may life be prolonged, but even youth may be restored by the surgeon's art. It is claimed that the implantation of gonads not only acts beneficially on sexual capacity, but that their internal secretion stimulates other enfeebled endocrine glands and rejuvenates the very blood vessels themselves.

While to the young is given energy and initiation, clear vision and inspiration, let them not forget what others have done. Goethe once said:

If I could give an account of all that I owed to great predecessors and contemporaries, there would be but a small balance in my favour. In point of fact we are all collective beings, do what we may; for how little have we and are we that we can strictly call our own property? We must all receive and learn, both from those who were before us and from those who are with us."

It is in recognition of the fact that we are all collective beings that we are gathered together in this Congress. May our united labours tend to the perfecting of truth! May we leave it strengthened by our fellowship, heartened to further effort! We cannot all hope to be Pasteurs or Jenners, Hunters or Listers, but each can, in Meredith's words "go forth in faith if he has made his mind God's temple, dedicate to Truth." To modify the words of St. Paul: "Reaching forth unto those things that are before, let us press towards the mark, for the prize of our high calling."

Ours is indeed a "high calling" offering, as Paget said, "the most complete and constant union of those three qualities which have the greatest charm for pure and active minds: novelty, utility and charity."

Although our profession is such a high calling, it does not always receive full acknowledgement as such. Sir Clifford Allbutt once observed that Medicine is the Cinderella of the professions. The

Church, the Navy and the Army, the Law have long been established in society with social recognition and privileges not yet granted to Medicine. Our profession, however, is steadily growing in influence and claiming its rightful place in the councils of the nations. Men like Monsieur Clemenceau, Sir Auckland Geddes, Dr. Addison, Sir William McGregor, our own Drs. Earle Page and Stanley Argyle and others have proved that, given opportunity, medical men can successfully occupy the highest positions in the State.

Nevertheless, governments and their officials not only frequently fail to take advantage of medical opinion, but even flout it, as in the case of the *National Insurance Act* in Great Britain, the recent *Health Act* in Victoria and the amendments of the *Medical Act* in Tasmania, the last one of the most flagrant examples of unjustifiable and iniquitous legislation imaginable.

In conclusion, it may be asked to what end do we devote our lives to this high calling, "scorn delights and live laborious days" that we may study life and promote its culture? What conception have we formed of any general scheme of life and of its relation to the universe?

The training of medical practitioners tends to make them adopt a mechanistic, material conception of life. The student must deal with the body as a machine and regard its activities as responses to external physical stimuli. It is the only way in which, at present, he can advantageously study life. But it does not follow that human life is solely mechanical. R. L. Stevenson, speaking of the strangeness of man, said: "To touch the heart of his mystery we find in him one thought, strange to the point of lunacy, the thought of duty, the thought of something owing to himself, to his neighbour, to his God." If life be purely mechanistic, the response of structure to environment, whence comes this urge of duty? Why do men always strive to know, why do they pursue research? Is it not because, in the words of Meredith:

The gloomy wherefore of our battlefield
Solves in the spirit.

Professor Haldane, a physiologist and a physicist of admitted eminence and authority, recently asserted that:

The attempt to establish biology on a mechanistic basis has been a gigantic failure Since the time of the mechanistic movement in biology last century it has been generally taken for granted by physiologists that in the investigation of life all considerations of a so-called teleological character must be left out of account, and this assumption has, in every direction, fettered and misled investigators. The time has come for examination of our axioms and a strict inquiry as to how far they are valid and consistent with experience. In the course of this examination the spiritual interpretation, as the supreme interpretation, of the universe is coming again to his own.

This opinion corroborates what Sir Harry Allen told us at our last Melbourne meeting. Some may remember his words: "Let us rather hold that in every manifestation of energy the physical and the spiritual are both present."

Lord Balfour in a recent lecture asked: "Can we believe that Unreason has produced Reason? Is it not necessary to postulate some form of Reason, some element of purpose in the beginning and as transfusing the process from beginning to end?"

May not each of us say in the words of Tennyson:

Yet I doubt not through the ages one increasing
purpose runs

And the thoughts of men are widened with the
process of the suns

and hold with Meredith that we are "Sprung of an aim, supernal of Reason, to find the great Over-Reason, we name Beneficence—Mind seeking Mind."

We, as rational members of a scientific profession, must believe in organic evolution, must agree with the American Association for the Advancement of Science, in its recent pronouncement, that "No scientific generalization is more strongly supported by thoroughly tested evidence." Students of history and sociology, however, assure us that there is no absolute law of human progress. Man has advanced, he has also retrograded. Man lives in an environment of two kinds—the one physical and permanent—a universe of unalterable law, the other artificial, created by himself and capable of modification. Most of man's ills, as Metchnikoff has well pointed out, including his diseases, are due to want of adaptation. It is man's duty to search out the unalterable laws and adapt himself to them, for he has extraordinary adaptability and also to find out how his artificial environment can be modified, his condition bettered, his progress assured.

Kipling has told us that "Man has always searched and more than any other the medicine man, the healer has been hottest on the track; he went up against the darkness that clothed him, to find out what order of created being he might be, to find the Divinity hidden in him, to find the essential unity of all created things."

In endeavouring to pierce the darkness and mystery that surround us, we do well to be humble and reverent. Let us remember Pasteur's attitude, indicated in the following words of his oration on Littré:

He who proclaims the existence of the Infinite, and none can avoid it, accumulates in that affirmation more of the supernatural than is to be found in all the miracles of all the religions; for the notion of the Infinite presents that double character—that it forces itself upon us and yet is incomprehensible. When that notion seizes upon our understanding, we can but kneel.

In this spirit let us search on, and hope ultimately to find "this essential unity of all created things," the unity of which Tennyson sang: "One God, one Law, one Element and one far off Divine event to which the whole Creation moves."

Votes of thanks were proposed by Sir William Macewen and Dr. Earle Page and were carried by acclamation. The Premier of Victoria, the Lord Mayor of Melbourne, the Minister of Health of Victoria (Dr. S. S. Argyle), Dr. F. Antill Pockley and Dr. A. C. Purchas made short speeches.

Popular Lecture.

THE EMOTION OF FEAR IN HEALTH AND DISEASE.

By SIR JOHN MACPHERSON, C.B., M.D., F.R.C.P.E.,
Professor of Psychiatry, University of Sydney.

THERE is a close similarity between fear and pain. They are both signs and warnings of danger to the organism and of the need for caution and rest. Some of the medical men present may remember Hilton's great book on "Rest and Pain" published about the middle of last century which exercised a profound influence on medical and especially surgical practice. A similar treatise on fear at the present day would not be inappropriate.

Fear and pain are the guardians of life, for without them the continuance of higher animal life on this planet would be impossible. They also form the two pillars at the gateway of what we call success, for no achievement is possible without suffering.

Finally, fear and pain are co-relatives; they might even be said to be identical in so far as the one is manifested as a psychical, the other as a physical warning; in other words, fear is psychical pain and pain is physical fear.

No power in heaven or earth can abolish fear and pain, for they are inextricably woven into the mystic web of the universe. It may sound incredible, but the statement I have just made is by no means universally believed in at the present day. During the past one hundred and thirty years, practically since the French Revolution, one of the strangest delusions that humanity ever conceived, has been zealously promulgated chiefly by politicians for their own ends. It is only fair to say that politicians are not alone responsible, but that scientists and philosophers of the type of Herbert Spencer have contributed to it by preaching the doctrine of the ultimate perfectibility of the human race.

The delusion consists in the belief that the spiritual millenium can be literally transferred to earth in the form of a materialistic paradise.

The following is the description of the millenium in the Apocalypse. "And God shall wipe away all tears from their eyes: and there shall be no more death, neither sorrow nor crying: neither shall there be any more pain for the former things are passed away."

It would take me too long to quote the predictions of politicians and the speculations of scientists and philosophers which adumbrate the literal advent of each of these miraculous benefits on earth. More to the point is the criticism of a modern writer who says: "They promise us an earthly paradise at the end of a flowery path and lead us to a premature hell at the end of a way of blood."

"But surely," I can imagine someone remark, "the medical profession exists for the relief of suffering." By no means; only for the relief of suffering caused by disease which, great though it is, is only a part of human suffering.

The universal prevalence of fear in Nature is beautifully depicted in Kipling's lines:

Very softly down the glade runs a waiting watching shade,
And the whisper spreads and widens far and near.
And the sweat is on thy brow, for he passes even now,
He is Fear, O little Hunter, he is Fear.

"The progress from brute to man," said the late Professor William James, "is characterized by nothing so much as the decrease in frequency of the proper occasion for fear. In civilized life in particular it has at last become possible for large numbers of people to pass from the cradle to the grave without ever having had a pang of genuine fear. Many of us need an attack of mental disease to teach us the meaning of the word. Hence the meaning of so much blindly optimistic philosophy and religion."

James was one of the most distinguished psychologists of our time and to venture to differ from him requires courage, but here I confess, I cannot follow him. Certainly the proper occasion for fear which dogs the savage, differs much from that which haunts civilized man. The savage fears death more than life, the modern man fears life more than death; the savage fears disembodied spirits, civilized man fears ideas incarnated in his fellows. When we compare the eternal preoccupation and worry of modern man with the long periods of absence of care which characterize the life of primitive man, it is questionable whether, if a balance could be cast, it would not be in favour of the latter.

Carlyle came nearer the truth when he said the reason why pictures of the past are always so golden in tone, so delicate in outline is because the quality of fear is taken from them. It is the fear of what we may be and of what must be that overshadows present happiness, even though all our darkest and saddest experiences may have left us unscathed.

The Book of Job, which is believed to be the oldest drama in the world, says that: "Man is born to trouble as the sparks fly upwards."

Montaigne writing two thousand, five hundred years later says: "The thing in the world I am most afraid of is fear."

Three hundred years later than Montaigne, Emerson wrote: "Fear is a carrion crow and though you see not well what he hovers for, there is death somewhere."

In a matter of this kind where each of us can appeal directly to his own experience, quotations from various authorities should be unnecessary were it not for the extraordinary perversity of thinking which surrounds the subject.

When we proceed to inquire what fear really is, the answer cannot be given in the form of a succinct definition without explanation. Thanks to the labours of such brilliant psychologists as Ribot, James, Lange, Shand and Macdougall we possess clearer ideas regarding the instincts and the emotions than ever before.

An emotion is the consciously felt expression of the impulse of a specific instinct. In other words the emotion is the subjective aspect of the unconscious instinct. Instinct is fundamental to any explanation of the mind process of all animals. It is an innate disposition which determines its possessor to perceive and pay attention to objects of a certain class, to experience an emotional excitement of a particular quality upon perceiving such an object and to act in regard to it in a particular manner.

The excitement or emotion is, according to the theory of Professor James of Harvard and Professor Lange of Copenhagen—a theory arrived at by these two authorities

independently the one of the other—wholly physical. That is to say the emotion of fear is accompanied by pallor of the skin, trembling of the limbs and dryness of the mouth, and of anger by flushing of the face, constriction of the muscles and increased blood pressure *et cetera*. That according to them is the emotion; it is conscious and may be overwhelming. The instincts upon which these emotions depend, are unconscious save for their expression as emotions.

The instincts of man are exactly the same as the instincts of all other animals. Instinct in fact is life.

Consider for a moment the organic unconscious life of all animals including man; the beating of the heart, the respiration of air, the digestion of food, the functions of growth and of reproduction.

Consider also the extraordinary power of instinct in the life of the bee and the ant and we see the enormous part that instinct plays in the lives of all animals including man. As few people still strenuously cling to the older psychology which ignored instinct and elevated intellect as the one and fundamental factor in human life.

To such people I would say somewhat as follows. Most men eat, sleep and fall in love and these three instinctive processes bulk very largely indeed in the lives of humanity. What part does intellect take in connexion with them? Intellect is only requisitioned to intervene for the purpose of regulating and refining our indulgence in them, of increasing our pleasure in them or for preventing others from robbing us of our participation in them. Intellect could not make us hungry or sleepy, nor could it dictate our love for the opposite sex, nor could religion stimulate our love for mankind unless these were founded upon instincts inseparable from our nature.

Man then is a bundle of instincts which form the basis of all human activity and the emotions accompanying these instincts supply the driving power by means of which all our actions, whether they are good or bad, are initiated and carried on. Take away the impulses coming from these instincts and we would become incapable of activity of any kind.

The emotions, therefore, which, as I have said, are the subjective expression of our instincts, are by far the most powerful forces in the universe. Although the instincts with their accompanying emotions are similar throughout the higher animals, including man, the manifestations of the human instincts are greatly modified by the human intellect which vastly exceeds that of any other animal lower in the scale. Essentially, however, the instincts and their emotions are practically the same in all animals.

The following is a list of the chief human instincts with their accompanying emotions:

<i>Instinct.</i>	<i>Emotion.</i>
Self preservation.	Fear.
Self abasement.	Submission.
Self assertion.	Elation.
Curiosity.	Wonder.
Pugnacity.	Anger.
Parental.	Love.
Herd.	Indefinite Emotion of Loneliness.

We see that each instinct has its own special emotion and that the emotional expression of the instinct of self preservation is fear.

Just as a healthy man does not know that he has a heart or lungs until something goes wrong with them, so we know little about our instincts until their emotions force themselves upon our attention.

The emotion of fear very quickly teaches us the lesson of self preservation. It induces us to avoid danger and to preserve ourselves from injury and death. It is our constant accompaniment in all the affairs of life prompting us to avoid rash conduct and leading us in the paths of sobriety and humility. It is present throughout the whole animal kingdom and manifests itself in the human infant in whom it is evinced by loud noises, by being held too loosely in the arms or by the presence of animals or strangers. In most animals including man it manifests itself by two impulses,—the impulse to concealment and the impulse to flight. Fear exercises a profound and deleterious effect upon the organism especially upon the nervous system.

Crile, the American surgeon confined a dog and a rabbit in a large cage. The rabbit was completely protected by strong wire netting so that the dog could do it no physical harm. The dog became very excited and of course the rabbit could neither run away nor conceal itself. After a certain time the dog was withdrawn and the rabbit immediately killed. An examination of its brain cells revealed the most profound changes in them consisting of a degeneration which was indistinguishable from that produced by virulent toxins, prolonged insomnia or extreme exhaustion.

We know that great fear can cause tremors, palpitation of the heart, paralysis of motion and even death.

Such, very briefly, is the nature of fear and its underlying instinct. More recently Professor Freud, of Vienna, intoxicated by the phenomenal adulation of his numerous disciples, has thought fit to formulate a new and novel explanation of the origin of fear.

I quote from one of his latest books in which he says:

What psychology has to say about emotion—the James-Lange theory for instance—is utterly incomprehensible to us psycho-analysts and impossible for us to discuss. We believe we know what this early impression is which is reproduced as a repetition in the anxiety emotion. We think it is the experience of birth—an experience which involves just such a concatenation of painful feelings, of discharge, of excitation and of bodily sensations as to have become a prototype for all occasions on which life is endangered, ever after to be reproduced again in us as dread or the anxiety condition.

The enormous increase in stimulation effected by the interruption of the placental circulation was the cause of the anxiety experience at birth.

And then follows a characteristic Freudian symbolism:

The name, *Angst* (anxiety), *Enge* (a narrow place, a street), accentuates the characteristic tightening in the breathing which was then the consequence of a real situation and is subsequently repeated almost invariably with emotion. It is very suggestive, too, that the first anxiety state arose on the occasion of the separation from the mother. We naturally believe that the disposition to reproduce this first anxiety condition has become so deeply ingrained in the organism through countless generations that no single individual can escape the anxiety emotion.

The audacity of such a statement is only equalled by the slavish credulity of the thousands of educated people who accept it.

When we inquire upon what evidence such a theory is

based, we have not far to seek. It is the result of the psycho-analysis of certain individuals which has been successfully carried back to the sordid details of their own birth and even in some cases—incredible as it may seem—to pre-natal life. Should any ordinary individual venture to cast a doubt upon such a possibility, he is invariably silenced by the retort, "Ah, but you are not a psycho-analyst and you cannot judge."

Fortunately we have other means of judging.

In the same book from which I have already quoted, ("An Introduction to Psycho-Analysis") Freud makes the following remarkable statement:

Now, the astonishing thing is that these scenes of infancy are not always true. Indeed, in the majority of cases they are untrue and in some cases they are in direct opposition to historical truth. After a little reflection we can easily see what it is that is bewildering in the matter: it is the neglect of the difference between phantasy and reality. It is a fact that the patient has created these phantasies, (but) in contrast to material reality these phantasies possess psychical reality and we gradually come to understand that in the world of the neuroses psychical reality is the determining factor.

We come to this then that Freud has constructed a serious psychological theory of the emotions based upon the admittedly unreliable phantasies of mentally abnormal individuals.

I pass now to the influence of the emotion of fear in the causation and aggravation of disease. The subject is so extensive that I must limit myself to a consideration of one branch of it, namely the forms of disease of a more or less purely mental description known as the psycho-neuroses and the psychoses or in plain language certain forms of functional nervous and mental affections.

The conscious life of a normal man is a strictly regulated, delicately poised mechanism. Consciousness is wholly directed to the present and to an anticipation of the future and only those memories and associations that are of useful purport are permitted to enter consciousness. The human brain is the instrument by means of which consciousness is concentrated upon the present and it is also the instrument by means of which useless and injurious memories are excluded from consciousness. In other words it is the instrument by means of which man is adapted to his environment.

This mechanism is as meticulously regulated in health as are the physiological functions of the body, the respiration of air, the circulation of the blood or the assimilation of food. When the adjustive mechanism breaks down, the result is either an inability to recall useful memories or to exclude injurious or useless memories.

It is only, therefore, when this mechanism temporarily fails, breaks down or is diseased that extraneous, useless or injurious memories or ideas are permitted to enter and dwell in consciousness. It is these extraneous memories with their emotional tone which give rise to and aggravate the symptoms of functional nervous affection.

The most common cause of the temporary failure of the mental adjustment of the individual to his surroundings is either a physical illness or the shock of some emotion, such as fear, anger, sorrow, jealousy, hatred *et cetera*. These or any of them may be sudden and overwhelming or by long continuance may wear down the physical and mental resistance of the organism.

The two great central factors in mental life are memory and forgetting.

Everything that we have ever heard or seen, that we have ever thought or done, that we have felt or experienced is strictly conserved and is capable of recall with the emotions attendant on it. Forgetting is an equally important function of mind, for it is evident that if we remembered everything, it would be as embarrassing as if we forgot everything; but by virtue of the wonderful adjustive mechanism to which I have referred, only the memories important for the present purpose are selected and brought to the light of consciousness and further this adjustive mechanism has a condensing faculty whereby the memories of a life time can be abridged within the space of a few seconds or minutes. Everyone of us, for example, carries the multiplication table intact in his subconscious mind,—a task perhaps attained after much pain and tears. When any of us wish to know the product of say seven times seven, we do not recall the whole table, much less our sensations in learning it. We simply and at once select the multiple forty-nine. So throughout all the affairs of mental life.

I shall have to trouble you with one more psychological illustration in order that you may more fully grasp the subject.

When I see an ordinary house I experience a sign or symbol—in psychological language a percept—but it stirs no emotion within me; it is fraught with no meaning. Yet when I see the house in which I was born and in which my nearest relations have lived and died, it has meaning to me and an emotional tone. When I saw a house to which I was indifferent, only the symbol, the sign was present in consciousness; when I saw a house which stirred up old memories with their emotion, the sign faded out of consciousness. Therefore the sign and the meaning are never present in consciousness at the same time.

If this takes place regularly in normal thought, it occurs with an exaggerated intensity in the subjects of nervous disease who are generally unconscious of the origin of the distressing emotions which torment them.

Now when a normal person is subjected to a powerful emotion which stirs up old memories and emotions within him, if his psychic adjustive mechanism is intact, after a longer or shorter time it readjusts itself to the ordinary environment, but if the emotion is overpowering and especially if the adjustive mechanism is weak—as it is in all neurotics—the mechanism breaks down and other emotions arising in the subconscious, enter consciousness and produce the symptoms of the functional neuroses.

Of all the emotions which thus enter consciousness, fear is, if not the exclusive, at anyrate by far the most predominant one. There are few physical or mental symptoms in the range of the functional neuroses and psychoses which cannot be traced to this emotion. Neither the sex instinct nor the parental or social instincts can compare with it in its influence in producing psychopathic affections.

In the last resort all mental conflict and repression and regression are referable to the influence of fear and they only become pathological because of their association with this emotion. Neither conflict nor repression can give

rise to a mental malady. All men experience them. But when the emotion of fear is superadded, as it always tends to be in neurotic subjects, the result is disastrous. Whether we are conscious of it or not we are all born into a hostile world. In very early childhood each of us instinctively begins to build up a mental defence against the resistances with which we feel ourselves to be surrounded. By means of this defence we strive to conceal our weaknesses, to conciliate our superiors, to hold our own with our equals, to dominate our inferiors and to attain to some goal, imaginary or real, which we have set up as our aim and object.

It must be obvious that the strength and utility of this defence depends upon the integrity of the mental organization which has constructed it. That of the normal child either rests upon reality or is not so far removed from it that he cannot come down to reality when necessary. It is different in the case of the neurotic child. His defensive structure is divorced from reality in direct ratio to the degree of his mental abnormality.

Both the normal and the neurotic child experience fear from early infancy onwards and the memory of these fears is conserved in both equally. As they approach adult life the flimsier defence of the neurotic largely based upon unreality and phantasies is apt to be rent asunder either by the strength of passions or the adversities of existence. He falls back upon a second line of defence against the fears and resuscitated memories of fears which crowd into his consciousness with the result that he develops a neurosis.

Professor Edwin Bramwell, of Edinburgh, has supplied a very neat simile of a neurosis. He pictures a woman alone in a house on a stormy winter evening sitting by the fire reading a book. A piece of coal falls from the fire and whereas up to that time the woman in question has been absorbed in her book and quite oblivious to all outside sensations, her senses are now on the alert. She hears the wind in the chimney, the clock ticking on the mantel-piece and, it may be, a door creaking. She says to herself: "Is there any one in the house?" The more she concentrates her attention on the swinging door, the louder the noise appears to become and the greater her anxiety.

Finally she leaves the room, satisfies herself that all is well, sits down by the fire again and is soon deeply interested in her book and quite unconscious of the various sounds which a short time before had occupied her attention.

The disturbance produced by the piece of coal falling from the fire may be compared to the shock or illness or whatever it was that originally determined the neurosis. The anxiety and the search of the house may be compared to the symptoms of a neurosis and the discovery that there was nothing wrong to its cure.

According to Professor Freud, of Vienna, the basic cause of the formation of the neuroses and psychoses is an abnormality in the development of the functions of sex. From that alone proceed the train of circumstances which result in the development of the symptoms of all functional nervous maladies. The theory is highly technical, much more so than the ordinary lay reader suspects.

I have come to the conclusion that the majority of people who glibly profess themselves Freudian, are as innocent of a knowledge of this theory as they are of Einstein's theory of relativity. They are content with a superficial acquaintance with the method and are unaware that in certain essentials the method and the theory, which are distinct, stand or fall together.

As to the extensive literature on the subject which is showered nowadays upon an indiscriminating public, I can only describe it as pornographic issued under the thin guise of scientific information.

It is high time that its distribution were restricted to people capable of understanding it.

It is a useless and ungracious task to attack Freud for two reasons. Firstly, because he is a great man and the good he has done, will live after him (unfortunately the evil he has unwittingly wrought will not be buried with his bones); secondly because the death knell of the Freudian theory (as apart from its method), was sounded some time ago when two of its most distinguished adherents, Adler, of Vienna, and Jung, of Zürich, conscientiously separated themselves from it and denounced it.

We learn from history that every movement has more to fear from its disciples than from its critics. As a rule the disciples of the founder of a new doctrine, who are inferior to himself, generally end by caricaturing his teaching and rendering it ridiculous. The law of the swinging pendulum is always a safeguard against extravagant doctrines and the indications are that it has already begun to swing strongly back from the zenith of the Freudian ascendancy.

When all has been said, however, we are bound to confess that the elaborate clinical work of Freud and his disciples has greatly enriched our knowledge. They have drawn attention to facts previously unknown, and explained many others that were misunderstood. In time to come when the phantastic generalizations, the puerile deductions and the ridiculous symbolisms which occlude the more serious work of this school, are forgotten, we shall only remember one thing that psycho-analysis has rendered great services to psychiatry and neurology.

Before leaving this subject I should like to correct one misapprehension. The Freudian doctrine has been christened the "new psychology." It is not new for its frame work was introduced into Europe over a hundred years ago by Schopenhauer in his great work, "The World as Will and Idea." It is not a psychology but a metaphysic, and an oriental metaphysic borrowed by Schopenhauer from the Vedie philosophy of India dating back probably two thousand years before our era.

In Schopenhauer's writings are clearly set forth the Freudian principles of conflict, resistance, repression and conversion. I select the following quotation.

The resistance of the will to allowing what is contrary or disagreeable to it to enter consciousness marks the place in which madness can break into the mind. Each new adverse event must be assimilated by consciousness and must receive a place in our system of interests whatever it may have to displace that is more pleasing to us. This operation is generally painful and often takes place slowly and after resistance. The health of the mind can only continue so long as this process is properly carried out. Should this process be imperfectly performed the disagreeable subject may become completely suppressed because it is unendur-

able and the gap left is filled up by the unconscious. Thus, madness appears, for consciousness has abrogated its proper function in order to appease the will and the man therefore imagines what does not exist.

Yet the madness which has thus arisen, is now the Lethe of unendurable suffering; it is the last remedy of harassed nature.

Truly there is nothing new under the sun.

I pass now to a very brief consideration of the vexed question of psycho-therapy so far as it concerns the treatment of functional nervous disorders.

Psycho-therapy is as old as the records of the human race. There is probably no primitive people at the present day among whom it is not practised with more or less success. Among two such widely separated peoples as the Samoyeds of Siberia and the Patagonians of South America there exist regular priesthoods—diviners, soothsayers and healers—whose ranks are carefully recruited from among the young neurotic members of the tribes, especially epileptics and hysterics, for these are believed to be endowed with psychic powers in which ordinary people are deficient. This belief is prevalent at the present day among certain sets of cultured and educated people.

We can trace psycho-therapy down through written history from its beginning to the present day.

It is an unwarrantable assumption to suppose that the methods of primitive peoples in this respect are less effective than those of modern practitioners. That they used and still use hypnotism and suggestion is certain.

The most authentic fact I can adduce is a statement by R. L. Stevenson about an experience of his own. One day while suffering from a cold, he paid a visit to an island chief who noticed his ailment and offered him the services of his medicine man. Stevenson consented. The medicine man sat down in front of him, made a few passes and the catarrh vanished instantaneously.

What is psycho-therapy? What are its methods, its mechanisms and its mode of action?

Janet, of Paris, one of the foremost and most successful of living psycho-therapists replies as follows:

At the present time psycho-therapy as an exact science does not exist (*n'existe pas*). At the very most we are only beginning to discover what it ought to be and what it will one day become.

A modern system of scientific therapeutics should have many and varied methods at its disposal each of them applicable to appropriate cases and symptoms and the probable effect of each of them should be known beforehand. How far this is from being the case we may easily discover.

There are three main schools of orthodox medical psycho-therapy at the present day. Their chief exponents are men of irreproachable character and probity.

There is first the school represented by Dubois, of Berne, and Dejerine, of Paris. They say in effect: "We use no mysticism or magic or lights or mirrors or crystal globes. We do not work behind closed doors or drawn curtains. We get to know our patients through and through, their life histories, their family histories, their troubles, their trials, their difficulties. Having done so, we sit with them, walk with them, talk with them and reason with them and point out to them where they are

thinking and acting on wrong lines and we thus cure them." Do they cure them all? "Alas no," says Dubois, "but my results are as good if not better than those obtained by any other method."

Next there is the French school of whom Janet is the outstanding personality. Like his great teacher, Chareot, he chiefly uses hypnosis, but he is not so bigoted as to refuse to use other methods and his results with hypnotism have been very successful.

He is extraordinarily candid as to his results and only claims to have cured 50% of his patients.

The third school is that of the psycho-analysts, chiefly followers of Freud to whom we owe psycho-analysis. That they also are successful there can be no doubt, but they are unfortunately for themselves too reticent on the subject of their failures. That they have failure is only too manifest to other members of the medical profession.

They say—at least the Freudians say: "We dig deeper and deeper by protracted analysis into the patient's unconscious mentality, until we unearth his sexual depravities, which we work off into consciousness and thus remove once for all the fundamental basis of all functional nervous diseases." What are we to say to all this? These schools of psycho-therapy are like men selling in the market place vociferously proclaiming their own wares. I might have included divine healing, Christian science and the new thought movement for undoubtedly they also effect cures.

Underlying them all there must be a common principle, a *modus operandi* of which we are completely ignorant. Some say it is the personal influence of the operator, others that it is suggestion, others again that it is the purging from the mind of hidden complexes. Perhaps it is all three and perhaps something more besides.

Do these methods or any of them enable us to attain to the cure of psychopathic maladies with the same certitude or even with the same probability of success as prevails on ordinary medical or surgical therapeutics? Unfortunately the answer is that they do not.

Too often all forms of treatment utterly fail. A great number of the sufferers become chronic invalids. A considerable number after temporary relief relapse into their former condition. Some of the forms of treatment are so prolonged that it is a perfectly legitimate criticism to say that the patients might have recovered in the time without any treatment.

In all the circumstances it might be advisable to abandon psycho-therapeutics altogether until with the steadily advancing progress of psychology we were able to apply it scientifically. There are two strong reasons against doing so. The first is that suffering humanity cannot wait and so long as a certain proportion of them are cured or relieved by this means, they will continue to demand its application. The second reason is that psychology has come to be largely dependent on the study of morbid mental conditions. That being so, we must go forward in the dark under great discouragement and disappointment, believing that one day much that is now obscure, will be cleared up.

I have attempted to show the immense significance in animal and human life of the instinct of self preservation with its accompanying emotion of fear.

I have pointed out that fear is a guardian of life and

therefore its normal and invariable accompaniment, but it is a double edged weapon which by insensible degrees passes through every possible stage from the normal to the abnormal, until at last in some unfortunate people it saps the pleasure and meaning of life and may ultimately destroy it.

I do not think there is a single variety of functional nervous or mental malady—and their list is a long one—into which fear does not enter either as a causative or secondary factor of great potency. It exercises not only a disturbing influence upon the mind processes, but also profoundly disturbs the physical processes.

It is necessary, however, to delimit somewhat the classes of people who fall ill of these maladies. Freud has admirably expressed it when he says: "At one end of the series stand those extreme cases of whom one can say—these people would have fallen ill whatever happened, whatever they experienced, however merciful life had been to them because of their anomalous . . . development; at the other end stand persons who call forth the opposite verdict. They would undoubtedly have escaped illness, if life had not put such and such burdens upon them."

It is with the second class of people I am now concerned and I would like to add a rider to Freud's dictum and say: "If many of them had not put such and such burdens upon themselves."

In the first and last resort the burden which life offers these people and which they unwittingly shoulder, is the burden of fear.

It is not, however, the real fears, powerful as they no doubt are, which exercise the most baneful influence upon the human mind and body.

The subjective fears, the anticipation of evil and failure and disaster by their constant undermining activity, are much more productive of nervous breakdown than the great real fears which result from mundane, national or personal catastrophes.

These are the fears of personal inferiority, of injury to vanity, of loss of reputation, of social failure, of poverty, of frustrated ambitions and a host of similar calamities any of which may have a substantial basis in fact, but which are nevertheless seldom actually realized. But whether actually realized or not they may be psychically realized and in either case they link themselves up with the memories of fears in the past life of the individual and a mental or nervous breakdown results.

These cases must be familiar to every physician and every consultant who specializes in this branch of neurology. They are very numerous, much more so than is generally realized.

Many of them present a pathetic picture in so far as the material universe has slipped from under their feet and they are left with absolutely nothing to lay hold of.

It is unquestionably the fact that many of these people—and others besides them—could be spared much of their suffering and more easily regain their lost stability if our methods of education and discipline were essentially different.

The apparent objects and aims of modern education are towards a purely material prosperity and the great realities of life are ignored. Consciously or unconsciously we have set before us the delusion of a material millenium, a

composite of the Mahomedan paradise and the Christian millenium, the advent of which can be facilitated by bestowing upon the young a routine type of literary education.

A large proportion of the civilized people of this generation have accepted this illusion and have consequently repudiated Christianity for pure materialism is incompatible with religion. After all is said and whether we accept Christianity or not, we must admit that religion is concerned with the great realities of life. As St. Paul says, voicing the philosophy of Plato: "The things which are seen are temporal, the things which are unseen are eternal."

Let us accept the fact as it is, namely that a large part of the present generation have tabooed Christianity.

What have they substituted for its discipline, for its exposition of the realities of life, for its higher moral sanctions? Absolutely nothing.

It is a serious defect in modern education that it neglects the teaching of mental self discipline and sets no standard of higher values. The art of forgetting what is useless and injurious and concentrating on what is essential and profitable, if properly inculcated in youth, would revolutionize the mental health and efficiency of the people.

As matters stand people whose confidence in the stability of material things has been shattered, find themselves incapable of discovering any other refuge, because they have not been taught that there is any other.

If you have followed my argument so far, you will remember that we all have moments of fear from our infancy onwards and that the memories of these fears are conserved and are capable of being revived by a strong emotion of fear operating in the present.

Some people are constitutionally courageous; others are lacking in imagination; others again are constitutionally callous or perverted. These people escape the consequences of the fear emotion. But there is a large class, perhaps an increasing class, who are sensitive, imaginative and timid, upon whom the burdens of life weigh heavily.

It is upon them especially that the force of the fear emotion tends to act unfavourably. They get seized in the grip of circumstances. On the one hand there is the pressure of their environment; on the other hand the fictitious standard of values which they have acquired from others or constructed for themselves. That is the two sided framework of their conflict. If you remove the one or the other, the conflict ceases. It is not always possible to escape from the pressure of our environment, but surely it is possible by the inculcation of sounder moral principles or of religious teaching to alter our standard of values which are generally speaking fictitious.

The fears arising from false values are false fears. Why, for instance, should a man fear inferiority, seeing that we are all of us inferior in some respect and each of us inferior to some other individual. Why should he fear poverty if he realized that the vast majority of the race is poor and that happiness does not depend upon possessions. If humility and altruism are graces and pride and avarice vices, if as Plato taught and his followers to this day maintain, the eternal realities are goodness, truth

and beauty, it must be apparent that our current values are egregiously vulgar and wrong.

Unfortunately our standards of values are set so far as concerns the present generation and perhaps many generations to come. What advice then is there to offer to the numbers of potential neurotics liable to be swept off their feet at any moment.

The first obvious advice is to lead a physiological life, to avoid the hectic pleasures of modern civilization, to shun excesses of all kinds and to respect the health of the body and its functions for upon that depends largely the health of the mind.

The second advice is perhaps more difficult of attainment, but it should not be impossible. I give in the forcible rugged words of Carlyle:

"The first duty of a man," he says, "is still that of subduing fear. We must get rid of fear; we cannot act at all till then. A man's acts are slavish, not true but specious; his very thoughts are false; he thinks as a slave and coward till he have got fear under his feet. Now and always the completeness of his victory over fear will determine how much of a man he is."

Carlyle's advice is, perhaps, couched in a higher key than some among us are capable of reaching to. It nevertheless forms an ideal towards which we ought always to aim. These fears are largely the fear of being afraid, fears of past memories which are shadows and phantoms, which are unreal in so far as they are impotent, except they are harboured and succumbed to.

To those who are too weak or timid to benefit by Carlyle's virile teaching, my third and last piece of advice is: Lay hold or regain your lost hold of the comforts of religion. "What," some will say, "return to superstition"? The taunt of superstition as applied to religion comes ill from the mouths of this generation among whom superstition is rife. I need only refer to Marxism and Bolshevism, to spiritualism and Freudianism, to the tacit beliefs in a material millenium and the ultimate perfectibility of the human race.

Are we sure that religion is superstition? From the beginning of human history to the present time most of the greatest leaders in every department of life have been convinced of its truth in virtue of their own individual experience and have drawn their strength from it.

If they were superstitious, then some of us can afford to be of their company without derogation to ourselves. I am convinced from a long acquaintance with neurotics that those of them who are unable to stand alone, require a higher power than themselves to lean upon and that, with few exceptions, they can only find that in religion.

Congress Dinner.

The Congress dinner was held at St. Kilda Town Hall on November 15, 1923. There was a large attendance.

The guests included His Excellency the Right Honourable the Earl of Stradbroke, Governor of Victoria, the Honourable H. S. W. Lawson, Premier of Victoria, the Honourable Earle C. G. Page, Acting Prime Minister of the Commonwealth, the Honourable Austin Chapman, Minister for Trade and Customs, the Honourable Stanley S. Argyle, Minister for Public Health and Chief Secretary

of Victoria, Councillor W. Brunton, Lord Mayor of Melbourne, Sir John MacFarland, the Chancellor of the University of Melbourne, Sir William Macewen, representative of the Council of the British Medical Association.

Sir John MacFarland proposed the toast of His Excellency the State Governor and the Earl of Stradbroke replied. The Premier of Victoria proposed the toast of the Australasian Medical Congress (British Medical Association). Mr. G. A. Syme, the President, and Dr. A. L. Kenny, the Honorary General Secretary, replied on behalf of the Congress.

Dr. S. S. Argyle gave the toast of the visitors and coupled with it the names of Sir William Macewen and Dr. Arthur C. Purchas, the President of the Australasian Medical Congress of 1914 (Auckland). Sir William Macewen replied.

The Museum.

THE MUSEUM OF THE CONGRESS was divided into five sections. Each section was housed separately in rooms on the first floor of the new building of the School of Anatomy.

Pathology.

The exhibits in the sections devoted to pathology were specimens collected from the various metropolitan hospitals. Many were in natural colours. They were arranged to illustrate the papers read in the Sections. The following pathological conditions were represented: Uterine tumours, Paget's disease of the nipple and encephalitis (these two forming an exhibit by Dr. Keith Inglis), enlargement of the prostate, surgical diseases associated with renal insufficiency, *empyema thoracis*, dysentery in children. In addition there was an exhibit sent by Professor N. Hamilton Fairley from Parel, Bombay, of venomous snakes, of specimens to illustrate plague and guinea worm disease and of disease-spreading mosquitoes. Lastly there were several specimens of rare and interesting pathological conditions.

Dermatology.

An interesting series of wax moulages illustrating skin diseases by Dr. Herman Lawrence and a fine collection of photographs of skin lesions by Dr. A. W. Finch Noyes were exhibited.

New Appliances.

Some plaster slabs, casein splints and jackets and the manner of manufacturing these appliances were exhibited by Mr. Don Brown. Dr. F. L. Trinea displayed a labour-saving apparatus for use by women during parturition.

Hobbies.

Hobbies of medical practitioners formed a special department of the Museum. The exhibits included implements, weapons, playthings and the like to illustrate the habits and customs of Australian aborigines by Dr. G. HORNE; water-colour paintings, etchings, woodcuts and carvings by Dr. CLIVE STEPHEN; water-colour drawings by Dr. H. C. COLVILLE; *Lepidoptera* of Europe by Dr. A. J. TRINEA; water-colour drawings and boomerangs by Dr. S. PERN; book-binding by Dr. E. TEMPLE SMITH; book-binding and original editions by Dr. J. H. L. CUMSTON; wireless apparatus by Dr. DONALD SMALL and cabinet making and brass work by Dr. E. A. SPOWERS.

Zoology.

DR. COLIN MACKENZIE exhibited one hundred and twenty dissections of Australian reptiles, including monotremes and marsupials from the National Collection of Australian Zoology. These dissections represent the result of the work of many years. Its value to medical science is not fully appreciated. The exhibit attracted much attention and the specimens were much admired.

Exhibit of the Commonwealth Department of Health.

The Commonwealth Department of Health set up a large exhibition dealing with its activities in Australia and with the correlated problems of health. The exhibition was divided into seven departments.

The first department contained exhibits depicting mortality statistics of Australia. The method of presentation was by models made of woods to show at a glance the variations in the incidence and death rates of diseases for the various age groups and for each sex. For example, the infantile mortality was displayed on one base board to contrast the rate among infants under three months, between three and six months, between six months and one year. Similar models depicted the death rates from infantile diarrhoea and enteritis, tuberculosis, enteric fever and so forth. The incidence and mortality of mothers in child-birth were also shown in the same way.

In the second department the measures adopted to prevent the introduction of diseases from abroad were illustrated. This exhibit was labelled the section of marine hygiene and quarantine. The exhibits included a large outline map of the world, showing in colours the distribution of the quarantinable diseases, variola, plague, cholera, typhus fever and yellow fever in the year 1923. Other means were taken to illustrate the distance of these danger centres from Australia and the number of days occupied by ships in transit to Australia. Bills of health were displayed to emphasize the need for uniformity and greater detail. The question of the application of quarantine methods to travellers arriving in Australia by air ship and aeroplanes was the subject of further exhibits, including the primary health report signed by the late Sir Ross Smith on his arrival in Australia at the end of his memorable first voyage from England to Australia. The system of quarantine was explained by means of a model of a station and smaller models of exterior and interior construction of the various buildings, of automatically self-locking doors for the exclusion of mosquitoes and other disease-conveying insects, of disinfectors, of launches and the like. Other exhibits included photographs illustrating the improvements that have been enforced in the hygienic arrangements of the sleeping quarters, mess rooms and other accommodation for seamen.

The third section was that of tropical hygiene. Demonstrations were given of the value of larvivorous fishes in attacking the larvæ of mosquitoes. The chief fish employed for this purpose was the crimson spotted sun fish (*Melanotaenia nigrans*). The exhibits included maps showing the distribution of malaria, filariasis and leprosy in Australia, the Australian dependencies and in the

Pacific islands. Miss ROBERTS, of the Australian Institute of Tropical Medicine, Townsville, exhibited some fine water-colour drawings of flies, fleas, lice, mites and bugs. The best picture was an unusually fine colour drawing of the common Australian anopheline mosquito, *Anopheles annulipes*. *Culex quinquefasciatus*, the carrier of filaria in Australia, and *Aedes aegypti*, the carrier of yellow fever in America and Africa, were also well depicted by means of coloured drawings of unusual merit. The exhibit also contained some interesting photographs revealing the ravages of yaws, *granuloma venereum*, leprosy, *ulcus interdigitatus destruens* and elephantiasis. These diseases are prevalent in Australia, but care was taken to show by means of a series of photographs of children of the second and third generation of those residing in the tropical parts of Australia that the vast majority are healthy and robust.

A special section was devoted to the work of the Australian Hookworm Campaign. The exhibits included maps indicating the endemic distribution of hookworm infection in Australia, New Guinea and Papua, together with contour maps depicting the annual rainfall in each district. Models of the simple apparatus used by the medical officers of the Campaign were displayed. Demonstrations were given of the microscopical diagnosis of hookworm ova in faeces by various methods, including the Willis salt-floatation method.

In the section devoted to industrial hygiene there was a model ambulance room suitable for an industrial establishment. The equipment and furnishings were supplied by John Danks and Son, Proprietary, Limited. Systems of card indices for the keeping of records by industrial firms were placed at the disposal of the Department by Sands and MacDougall Proprietary, Limited. The work of the industrial hygienists was further illustrated by actual photographs of the medical service in operation. Standard chairs for use in factories and offices were also exhibited. An interesting series of wax models by Miss Rae, of Edinburgh, illustrated several occupational dermatoses. Other exhibits were displayed in connexion with mining and live-saving work. These included apparatus for determining the temperature, humidity, movement, dust content and chemical composition of air. Oxygen apparatus for use when the atmosphere is vitiated with poisonous gases, photographs of miners' cribs or underground eating places and the like were exhibited by the Mount Lyell Mining and Railway Company, Limited. Lastly there were displayed numerous skiagrams of chests to illustrate pneumoconiosis and allied conditions.

The section of sanitary engineering contained a large number of models of sanitary appliances lent for the occasion by the Trustees of the Australian War Museum. The models were made during the war by members of the Sanitary Corps of the Australian Imperial Force in the field. Two working models of different types of sand filters for water supplies with explanatory legends attached proved very instructive, as did a model of an ingenious method of dealing with the manure heap. The method insures that while flies deposit their eggs on the heap, the maggots are trapped and are prevented from developing into adult flies. A map was also exhibited il-

illustrating the progress of water conservation in Victoria. This exhibit served a very useful purpose in connexion with the problems of sanitation and hygiene in rural areas.

The last section of the exhibition was devoted to the work of the Commonwealth Serum Laboratories. The products offered for sale to the profession were housed in the Trade Exhibition. In this section the Department restricted itself to a display of the scientific work of the medical officers and others employed in the Laboratories. Each branch of the Laboratories received attention. First of all there was the public health and diagnosis work. On a map of Australia was indicated the situation of the existing and of the projected Commonwealth Health Laboratories. Those already in operation are situated at Townsville, Rabaul and Bendigo; those approaching completion are at Toowoomba, Rockhampton, Lismore and Port Pirie. Exhibited were the apparatus and cultures and other material provided at these country town laboratories. Demonstrations were given in connexion with this work of Maclean's method of estimating the sugar content of the blood, of the method of isolating *Bacillus typhosus* from faeces and of a method of isolation of the aene bacillus. A small plague exhibit included pathological specimens of infected rats and guinea pigs and cages for keeping rats. The Schick test was also the subject of a special exhibit. In the second place the veterinary side of the work was illustrated. Samples of milk infected with *Streptococcus mammitis* and other veterinary products were displayed. The third branch was the tuberculin preparation. In this exhibit strains of human and bovine *Bacillus tuberculosis* in culture on Dorset's medium and cultures of John's bacillus formed the basis. In the next place the results of Calmette's and von Pirquet's tests on guinea pigs were demonstrated on living animals, while the *post mortem* appearances of tuberculosis in laboratory animals were shown. The remainder of this group of exhibits illustrated the successive steps in the preparation of tuberculin. An admirable set of specimens were displayed to demonstrate the reactions of the several types of pneumococci. The next department of the section was reserved for the preparation of media for the culture of bacteria. The exhibits included the various media ready for use and the methods employed in their preparation, including the accurate adjustment of the desired hydrogen ion concentration. The group devoted to vaccines comprised the apparatus employed and the cultures used for the purpose. In addition there were displayed the methods of standardizing vaccines. These included the dark ground illumination method, the opacity method and the direct counting method.

There was a special corner reserved for exhibits relating to the standardization of disinfectants. The method employed at the Commonwealth Serum Laboratories is that advocated by the American Public Health Association, with some technical improvements devised by Mr. Sutherland of the Laboratories. Mr. Sutherland also showed a device for the quick delivery under sterile conditions of measured quantities of fluid. An important exhibit of considerable dimensions was that illustrating the process of refining and concentrating antitoxic sera. This consisted of diagrams to explain the method and apparatus. An-

other large exhibit of a composite character was one demonstrating the process of gaining and preparing therapeutic serum from the bleeding of the horse to the placing of the sterile serum in ampoules. Another exhibit of considerable interest was the demonstration of the preparation of "Insulin." Each step in the manufacture was shown, including the means for testing the potency of the finished product. In the last place the various service publications of the Department of Health and other literature were included in the exhibition.

Trade Exhibition.

AN admirably planned Trade Exhibition was held in a series of capacious rooms close to the entrance of the new Anatomy Buildings. This exhibition was organized by a special committee of which Dr. B. L. STANTON was Honorary Secretary. The following exhibits were displayed.

Books.

BUTTERWORTH AND COMPANY (AUSTRALIA), LIMITED, displayed the "Nelson Loose-leaf Living Medicine," a work comprising articles and abstracts by numerous authors on various subjects in medicine.

MR. ALLAN GRANT, of Collins Street, Melbourne, exhibited many recent medical books, including a copy of Mr. Hamilton Russell's collected papers on surgical subjects.

MR. JAMES LITTLE, of Collins Street, Melbourne, had on view several recent works published by W. B. Saunders Company. "The Medical Clinics of North America" and "The Surgical Clinics of North America" were prominent in the collection.

MR. W. RAMSAY, Lonsdale Street, Melbourne, had an exhibit of medical books covering a large range of special subjects. The exhibit included works published by The C. V. Mosby Company.

Drugs, Pharmaceutical Preparations and Disinfectants.

THE AUSTRALASIAN PHARMACEUTICAL CONFERENCE exhibited "The Australasian Pharmaceutical Formulary" and preparations of all the formulæ. Samples were freely distributed. The medical profession was urged to prescribe Australasian Pharmaceutical Formulary preparations.

MR. D. G. BULL, of Collins Street, Melbourne, had a stand with a variety of vaccines, tuberculins, mercurials, colloidal metals, pollen toxins, peptone solution, extracts of pituitary gland and of other glands, local anaesthetics and other specialities.

BURROUGHS, WELLCOME AND COMPANY had a large exhibit of their "Tabloid" preparations of drugs and combinations of drugs. Exhibits illustrated the stages of manufacture of animal gland preparations. "Kepler's Malt and Oil" in combination with other substances were also displayed. There were also "Soloid" preparations of antiseptics. Many sera, vaccines and tuberculins were displayed, as were medicine and hypodermic cases. The exhibit also included some kymographic tracings to illustrate the action of some of Burroughs, Wellcome and Company's glandular products.

THE COMMONWEALTH SERUM LABORATORIES displayed their various products (tuberculin, sera, vaccines, "Insulin" and so forth).

The "CIBA" exhibit comprised the following preparations: "Dial," "Lipiodine," "Phytin," "Digifolin," "Coagulen-Ciba," "Peristaltin," "Agomensin," "Sistomensin" and a collection of fine chemicals.

MESSRS. DUERDIN AND SALINSBURY, of Flinders Lane, Melbourne, included in their exhibit several disinfectants, "Kresape," "Lysol" and mercuric iodide and chloride tablets, several glandular products, many pills and tablets, galenicals and other pharmaceutical preparations.

H. FRANCIS AND COMPANY, of Bourke Street, Melbourne, showed among other preparations "Trépol," "Néo-Trépol," "Aspro-iodine," "Sedasprin," "Scillarin," "Contramine," "Butyn," "Elixir of Luminol," "Furonculine" and many galenicals, some of which are made from Australian-grown roots, fruits and so on.

GENATOSAN, LIMITED, had a stand on which was displayed "Sanatogen," "Formamint" and "Cystopurin," a range of detoxicated vaccines and a new acetyl-salicylic acid preparation known as "Genasprin."

The exhibit of MESSRS. MUIR AND NEIL, of George Street, Sydney, included the food "Roboleine," an assortment of ductless gland products in "Palatinoid" form prepared by Oppenheimer, Son and Company, Limited, a series of "Oscols" as well as an aerizer and vapourizer. There were also displayed some medicated soaps and Jeyes' disinfectants.

SALMON AND SPRAGGON (AUSTRALIA), LIMITED, showed among the pharmaceutical preparations of A. Wander, Limited, a liquid paraffin and malt preparation called "Cristolax" and combinations of malt and guaiacol, hæmoglobin, glyce-ro-phosphates and other substances. They also exhibited "Lactagol," "Iodinsol" and "Salicylosol."

THE SANITAS COMPANY had an exhibit of "Sanitas" disinfectants and antiseptics, including "Sanitas-Sypol," "Sanitas-Bactox," "Sanitas-Okol" and "Sanitas-Soldis."

MR. GEORGE WILLIAMS placed on view specimens of Denver Company's "Antiphlogistine," of Bristol-Myers Company's "Sal Hepatica" and several products manufactured by the Anglo-French Drug Company.

Food Preparations.

JOSEPH NATHAN AND COMPANY (AUSTRALIA), LIMITED, exhibited samples of "Glaxo" and "Glaxo-Malted Food." In connexion with this exhibit baby-weighing machines, maternity belts, feeding bottles and miniature feeding bottles were also exposed to view.

NESTLE'S. ANGLO-SWISS CONDENSED MILK COMPANY (AUSTRALIA), LIMITED, exhibited "Lactogen," "Maltogen" and "Malted Milk and Lactose."

MESSRS. MUIR AND NEIL placed among their exhibits the food preparation "Roboleine."

SALMON AND SPRAGGON (AUSTRALIA), LIMITED, displayed two food preparations. The first was A. Wander, Limited's "Ovaltine" and the second the Therapeutic Foods Company's "Energen" products, comprising bread, rolls, flour and meal. These latter are said to contain a fixed proportion of protein and carbo-hydrate.

THE SANITARIUM HEALTH FOOD COMPANY gave a display of many of their food products. The chief were "Granose" biscuits, "Granola" breakfast food, various nut foods and diabetic rolls and gluten biscuits. They also exhibited "Marmite."

Instruments and Appliances.

AUSTRALECTRIC, LIMITED, had an exhibit of their Expanse Type E. X-ray transformer, the new Wappler tilting table and the Wappler portable diathermy machine.

MISS BACK, of 91, Melbourne Mansions, Collins Street, Melbourne, displayed a number of nickel-plated wire trusses and abdominal supports.

THE BELGIUM KATANGA RADIUM COMPANY exhibited samples of radium and mesothorium and various forms of applicators.

DENYERS PROPRIETARY, LIMITED, of Swanston Street, Melbourne, had an extensive exhibit of surgical instruments, cystoscopes of British manufacture, urethroscopes, œsophagoscopes, bronchoscopes, pantostat or universal apparatus for using electric current from the main for divers purposes, operating tables, sterilizers and so forth.

ELLIOTT BROTHERS, LIMITED, exhibited instruments including a cervical guillotine for the *cervix uteri*, a special intra-tracheal insufflation apparatus for the administration of ether, Wappler's cystoscopes, baby-weighing scales, ureteral catheters, Maclean's apparatus for the estimation of the sugar content of the blood with the chemical required and interchangeable bladed knives.

THE HOSPITAL, ELECTRICAL AND RADIUM, LIMITED, had a large exhibit of X-ray apparatus of the Engeln Electric Company and demonstrated a 200,000 volt plant in working order. They also showed various surgical instruments, more particularly a series of urethroscopes.

MR. ALLAN GRANT placed on view some Zeiss microscopes and medico-optical apparatus.

KODAK (AUSTRALASIA) PROPRIETARY, LIMITED, displayed photographic apparatus and accessories used by radiologists, pathologists and microscopists. The new Eastman clinical camera was on view. A display of method of artificial lighting was given. This included the "Vent-lite" lamps, the "Wratten" filters and the "Rheinberg" filters. A model X-ray changing and developing room was fitted up. Other exhibitors were permitted to use this exhibit for the demonstration of X-ray apparatus.

MR. GEORGE S. MARTIN, of Collins Street, Melbourne, showed a large collection of surgical instruments and appliances including Chevalier Jackson's bronchoscopes, Kilian's suspension apparatus for laryngoscopy, George Wolff's cystoscopes and urethroscopes, Morton Inskeep's electrical ophthalmoscope. In addition abdominal retractors and other instruments were displayed.

The exhibit of MESSRS. MUIR AND NEIL contained in addition to the drugs and foods mentioned above a display of ligatures and dressings and apparatus for the estimation of sugar in urine.

PATHE CINEMA had an exhibit for the demonstration of the taking and projecting moving pictures. Three new type of Pathé projectors for use in universities and schools were shown. These together with the Pathé Ultra-Rapid camera were demonstrated.

RAMSAY, REABY PROPRIETARY, LIMITED, exhibited a large number of nose, throat and general surgical instruments manufactured by the firm in Melbourne. The exhibit also included instruments made by Mayer and Phelps.

H. B. SELBY AND COMPANY exhibited a wide range of laboratory glass-ware and apparatus, including biological incubators, centrifuges, inspissators, sphygmomanometers, microscopes, chemical balances, specimen jars, blood testing outfits, colorimeters and hæmocyetometers.

THE STANFORD X-RAY AND RADIUM COMPANY had a considerable exhibit of their apparatus (Waite and Bartlett), including portable outfits, new types of apparatus, recent improvements in Coolidge tubes, diathermy and high frequency apparatus, Sass Wolff cystoscopes and inspection lamps, X-ray measuring instruments (iontoquantimeter) and so forth.

W. WATSON AND SONS, LIMITED, placed a large exhibit on view. It comprised the Victor-Snook X-ray apparatus, the Victor-Kearsley stabilizer, the Watson-Caldwell diathermy apparatus, the Victor model X-ray table, the Victor improved model vertical Roentgenoscope, the Watson-Coolidge control and corona-proof high tension system, the Victor universal X-ray timer, the Victor stabilized mobile X-ray unit, the Watson-Caldwell X-ray unit, the Victor ultra-violet equipment and other radiological apparatus. Watson's microscopes were also exhibited.

Presentation to Dr. A. L. Kenny.

At the close of the final meeting of Congress Mr. G. A. SYME, the PRESIDENT, asked Dr. A. L. Kenny, the Honorary General Secretary, to accept for Mrs. Kenny a handsome piece of jewelry from the members of the Congress in Victoria, in token of their appreciation of his magnificent services in organizing the Congress. A certain sum of money had been subscribed and as there was a balance left over after the purchase of the gift to Mrs. Kenny, Dr. Kenny was asked to expend it in whatever manner he wished.

Section I.—Medicine.

THE DIAGNOSIS OF EARLY PULMONARY TUBERCULOSIS.

By S. A. SMITH, M.B., CH.M. (Sydney),
Honorary Assistant Physician, Royal Prince Alfred Hospital, Sydney.

ALTHOUGH the tubercle bacillus is the cause of all pulmonary tuberculosis and the characteristic elementary pathological change in the lung is always the same, the disease presents the most diverse clinical picture in different individuals. These pathological changes may produce effects which are either structural (recognized by physical examination) or chemical (toxæmic) recognized by the study of the symptoms presented by the patient and by an examination for general or constitutional disturbances. It must be recognized at the outset that there is no close correspondence necessarily between the amount of structural change and the intensity of the toxæmia.

This applies to all types of the disease in all stages. Considerable structural changes may exist with only the slightest evidence of toxæmia and many individuals present the indications of a severe toxæmia, in whom the evidence of localized disease of the lung is extremely slight. Speaking generally, of these changes toxæmia must be accorded the place of greatest importance in the early diagnosis of active lesions, since active tuberculosis or phthisis manifests itself invariably by symptoms of bacterial intoxication. If there are no symptoms of constitutional toxæmia, the patient may have been at one time infected with tubercle bacilli, but he is not sick with a disease which needs special treatment, costly to the community and often ruinous to the patient and his family.

The variety in the clinical picture presented by an early consumptive is explained by the varying combination of structural and toxæmic evidence which is presented in each individual.

It must be recognized at the outset that there is no single physical sign which is pathognomonic of the structural changes, and no single symptom or constitutional disturbance pathognomonic of the toxæmia. And to this we may add that there is no single biological test conclusive, in the present state of our knowledge, of the presence of an active tuberculous lesion. The demonstration of the presence of the tubercle bacillus is the only certain single sign of the presence of the disease in an active form. It is probably true that the average practitioner of medicine has in the past allowed his diagnosis to be influenced more by the detection of physical changes than by the recognition of the toxæmia. If attention be concentrated only on the physical signs of structural change in the lung, the presence of some slight or fancied change to percussion or auscultation may lead to an erroneous diagnosis of an early lesion. Much mental and financial damage may in this way be inflicted on the patient and his family and there is no consolation in the thought that it is better to err on the side of caution under the wrong impression that an erroneous positive diagnosis is safer for the patient than an erroneous negative one.

In point of fact, though it is a truism that every effort should be made to arrive at a diagnosis at the earliest possible moment, the comparatively slight delay caused by such a careful investigation as would remove all doubt, does no harm to the patient.

There is little difficulty in arriving at a diagnosis when there is a clear history of gradual toxæmia accompanied by definite physical signs with positive X-ray findings, even though the tubercle bacillus may not be detected in the sputum. There are, however, many instances in which the physical signs are of so slight and equivocal a character that they may escape detection unless special care in investigation be exercised. In such patients particularly the symptomatology demands the most pains-taking study. Without traversing the whole of this important aspect of the subject mention will be made of those features which from my own experience appear to be of special importance.

Dyspepsia and Anorexia.

It has long been recognized that many patients with phthisis give a history of early and continued indigestion. Among one hundred and sixty men suffering from simple

tuberculosis of the lungs discovered in the examinations at Broken Hill, 60% gave definite early histories of "indigestion." Anorexia is a most frequent complaint and it appears definitely to be of toxic origin. The symptoms are often similar to those observed in chlorosis, so that when they occur in a young woman, the true nature of the disease may be easily missed. The anorexia is peculiar in the fact that it is extremely capricious and is independent of the fever which may be present and it is not constantly accompanied by any change revealed by examination of the gastric contents or any discoverable secretory or motor disturbance. Patients frequently have been treated for weeks without avail by the medicinal means or dietetic devices which make such a strong appeal to many, when a systematic investigation of the symptoms, a study of the pulse and temperature and a careful physical examination would have demonstrated the real cause of the digestive disturbance.

Anaemia.

Many patients suffering from incipient phthisis present quite early an outward appearance of definite pallor. So great is this in some that it suggests a well developed or even profound anaemia, but in the pallor associated with pulmonary tuberculosis it is comparatively rare to observe considerable lowering in the number of red blood cells, although there is a definite diminution in haemoglobin content. When occurring in young women it is a not infrequent pitfall in diagnosis.

Neurasthenia.

The onset of phthisis is not infrequently accompanied by symptoms which may be vaguely defined as neurasthenic. Outstanding in the story of these people is the characteristic weariness which in some is worse in the morning and unrelieved by sleep and is in others observed as the working day wears on. With this are complaints of insomnia, palpitation and vague pains and irritability of temper. Some authors have been led to the lengths of declaring that a large proportion of the young adult victims of neurasthenia are really suffering from a tuberculous infection of the lung difficult of detection. Without subscribing to such a sweeping statement, one must recognize that the story told by many patients is one which suggests the pure neurasthenic.

I regard anorexia, anaemia and neurasthenia as three very important points in the symptomatology. In individuals in whom these symptoms are not accompanied by a history and physical signs which at once suggest their real cause, one may easily lose much valuable time before recognizing that they are due to incipient phthisis. In those patients in whom these symptoms are present as a manifestation of tuberculous toxæmia, a careful investigation of all the symptoms, of the pulse and temperature and a physical examination (in this I include always a radiographic examination) which is not perfunctorily carried out, will always disclose their true cause.

Among the toxæmic and constitutional signs of early phthisis fever and an increased pulse rate occupy the most important place. Early phthisis is usually accompanied by pyrexia. Some authors maintain that fever is invariably present and is necessary before a diagnosis of

activity can be made. Failure to detect it in active lesions is attributed to faulty technique or lack of care. Although firmly believing that pyrexia and an increase in pulse rate are the two most important and frequent signs of the constitutional disturbances of early phthisis, I have in some instances in which the minutest care was taken, failed to discover either, when other and conclusive signs of an early active lesion were present. It has been my experience on several occasions that while no pyrexia was detected when the temperature was taken at home by the patient or his friends, yet it was revealed when he was placed in hospital for observation. Bearing in mind the importance of this sign it is necessary that the most minute attention to detail should be observed. The thermometer must be reliable; it must be left in the mouth or rectum for five minutes and those factors likely to give a fallacious reading (especially when it is taken by the mouth) should be borne in mind and excluded.

Two things must be sought for in the chart, an actual abnormal rise or a greatly increased diurnal variation. These must be noted during rest and if necessary after exercise. It may be accepted that a mouth temperature, at rest, of over 37.3° C. (99.2° F.) and a daily variation of more than 1° C. (2° F.) demands explanation. In interpretation due regard must be given to those factors such as meals, exercise, hysteria and so forth, which may cause elevations not due to auto-intoxication. When very early active lesions are present in the lung these investigations of the temperature at rest show usually a rise sometimes only for two or three hours during the late afternoon or evening and very frequently a low morning temperature, such as 36° C. (96.8° F.) or below, which produces a daily oscillation of between 0 or 1.5° C. The inverted type of temperature is in my experience very rare in early lesions. When it does occur, it appears to have the gravest prognostic significance. In suspects, when the rest temperatures supply no positive evidence, the exercise temperatures should be investigated. Moderate to severe exercise in the healthy causes a definite rise of temperature, but it is transient, subsiding in a few minutes, certainly within one hour. In the patient with incipient phthisis the rise must persist for more than one hour to be significant. A useful test is to make the suspect walk two or three miles as quickly as possible and record the height and duration of the resulting rise. In many instances the pyrexia occurs unknown to the patient. Of special importance is the fact that it is frequently unaccompanied by anorexia, in this respect differing from the pyrexia which arises from other causes. Beyond producing a sensation of languor or fatigue it frequently gives the individual no sign of its presence. Speaking generally, the tuberculous patient is not prostrated by a high temperature to the same degree as those suffering from pyrexia arising from other causes.

These signs, though of extreme importance in the diagnosis of pulmonary tuberculosis in its incipient stage, are not pathognomonic. They occur in many other conditions, but are not likely to present any difficulties of diagnosis except in such conditions as focal infections, chlorosis, chronic sinus suppuration, and early stages of other severe anæmias and leucocythæmia. It is necessary here to mention the so-called hysterical pyrexia. When in a patient showing continued slight pyrexia all other causes than pul-

monary tuberculosis have been excluded, hysteria must still be remembered. That hysterical pyrexia exists I am convinced. I have seen individuals with an irregular temperature rising as high as 37.8° C. (100° F.) in the afternoon, in whom the utmost care has failed to reveal any cause and who have continued in good health for years under no other treatment than the destruction of the thermometer.

Increase in Pulse Rate.

The study of the pulse rate frequently gives information of the highest value in diagnosis, especially when considered in conjunction with the temperature. In some instances tachycardia and palpitation precede all other obvious and objective signs of the disease and these patients may be treated for heart disease or hyperthyroidism until a very careful search discovers the lesion. The disturbance is usually a persistent tachycardia and when this is unaccompanied by symptoms, the patient may be unaware of its presence. It is characteristically variable and unstable. Rarely the tachycardia is paroxysmal in character. Much discussion has occurred as to the reason why the tubercle bacillus should be so particularly prone to disturb the pulse rate. It seems probable that it is not due simply to toxæmia, because many patients who proceed to complete arrest, maintain a persistently increased pulse rate and suffer no apparent damage therefrom. In some, however, the pulse rate returns to normal under these circumstances. Toxæmia apparently plays its part. Whether the other factor is interference with the vagus, the small heart of early pulmonary tuberculosis, myocarditis or suprarenal hyperfunction remains unknown. Associated with tachycardia or even without it there is in the majority of cases a lowered systolic blood pressure which in doubtful instances is of value in diagnosis. Among those affected with simple tuberculosis in a not advanced stage at Broken Hill, 65% had systolic blood pressure of less than 120 millimetres of mercury.

In considering these few aspects of the symptoms and constitutional signs I have attempted to select those factors which supply most frequently the pitfalls of diagnosis and those from a careful study of which the most valuable evidence can be gained.

Physical Signs.

The physical signs of early disease are frequently most difficult of detection, but in very few individuals in whom a definite lesion is present does a careful examination fail to reveal at least some indication. Auscultation and X-ray examination are the means almost entirely relied on by many, but the more our opportunities and inclinations are, the more valuable become inspection, palpation and percussion and the greater expertness and precision develop. The degree of skill to which a man may attain, is limited, no matter how faithfully he strives, by the nature of his sensory equipment. Most of us, therefore, feel discouraged at ever reaching that pitch of perfection when we shall be able to distinguish by percussion an active early lesion from a healed one or to locate a small early infiltration by the particular character of the adventitia heard through the stethoscope. There is comfort on the other hand for the ordinary man when he recognizes that he does not need to be a "virtuoso in physical

diagnosis or a sharp in the interpretation of the X-ray plate" to diagnose a first stage lesion, but that a careful, pains-taking consideration of all the factors, the history, the symptoms, the physical signs (among which the radiographic findings occupy an important place) and the results of bacteriological and chemical tests will yield the soundest and most reliable results.

Attention to detail is of great importance in physical examination. In inspection we search only for signs of asymmetry in form and mobility. The patient should be in a good light, preferably seated symmetrically on a stool with the muscles in as complete relaxation as possible. The examination of a patient who is lying in bed or one who is attempting to hold up his trousers, is likely to lead to mistakes. In percussion faults in technique are very common and very easily adopted. We attempt by percussion to determine simply the density of the tissues set in vibration by the percussion stroke. The principal aim is to bring out the characteristic note of the tissues lying under the finger in as limited a superficial area as possible. Consequently it is advisable to percuss over intercostal spaces rather than over ribs, since in the latter case the superficial area of resonance is much increased. It is necessary to determine the changes occurring in the deeper tissues as far as possible. It is not possible to detect differences in density when the lesion is present only in the deeper parts of the lung. Even large areas of increased density, such as are found in small central hydatid cysts and early neoplasms escape detection by percussion if a fair amount of resonant lung overlies them. If we increase the force of the percussion stroke we increase more the superficial extent of the area of resonance than its depth. Consequently there is no value, indeed there is a positive disadvantage in the heavy percussion stroke. The strokes should be as light as is consistent with the bringing out of a true note and should be varied in strength only within certain limits to determine the condition in deeper structures. If the blow is too heavy, finer shades of difference cannot be distinguished. Except in certain special forms of percussion, only similar areas of the chest should be compared.

In auscultation the simplest form of instrument is the best. In the search for early signs the single phase method of comparing the inspiratory and expiratory murmurs separately is of great advantage and the signs heard with the whispered voice are of more value than is generally thought.

Inspection.

On inspection there is frequently to be observed on the side of the lesion a definite but slight spasm of the muscles attached to the shoulder girdle. This hypertonicity is reflex in origin and protective, similar to the tightness of muscles associated with inflamed organs in the abdomen. Its presence is well confirmed by palpation, although when well developed the muscles may be seen to stand out prominently. One must bear in mind that similar appearances may be present in the healthy chest from occupational causes, but after the exclusion of these it is a valuable sign of an early lesion, since it sometimes occurs when the infiltration is of short duration and not extensive. In old circumscribed or healed lesions the reverse condition is sometimes seen due to atrophic changes in

the muscles and subcutaneous tissues. Lagging in movement is frequently observed over an infected apex. It precedes definite limitation of movement and is an important early sign. It may occur with a slight infiltration or with an apical pleurisy, but is not a measure of its extent. It is not proportionate to the amount of airless tissue present, but is reflex and protective in character. Since inspection seeks to discover asymmetry only, it yields its best results in unilateral lesions, in which it is of very great value.

Percussion.

Percussion is held by some to be the method of physical examination most productive of results in incipient phthisis. Others on the contrary contend that auscultation is the earliest sure means of physical diagnosis. A consideration of the pathology suggests that the course of the lesion determines this question. Where the tubercles early involve the bronchioles and alveoli, one would anticipate auscultatory signs early. When on the other hand the infiltration spreads, involving the bronchi late but causing a very appreciable shrinkage or increase in density of the lung by its spread through the lung parenchyma, signs to percussion are likely to be discovered earlier than those discovered by auscultation.

Much attention has recently been devoted to special methods of examination by percussion. Of these, respiratory percussion, the topographical method of Krönig and tidal percussion deserve mention. I believe they are of limited value. Krönig's method by which the projection of the resonance of the apices on the border of the trapezius is measured, is of some help. The areas of resonance are easily brought out, but so many variations occur in healthy chests, especially arising from occupational causes, that as an isolated sign they should be allowed little weight in diagnosis. Limitation of the area is of more significance when occurring over the left apex than over the right.

Auscultation.

The literature abounds with assertions that this auscultatory sign or that is a sure indication of active apical tuberculosis. The fact is, as I see it, that no auscultatory sign is of itself pathognomonic. Usually the disease has progressed beyond the very earliest stage, speaking academically, before the patient is led to seek advice. In those infrequent instances where this is not the case, the inspiratory murmur shows the first sign of alteration "the granular breathing" of Graneher. This which is best recognized by single phase auscultation, together with the feeble breathing due to the compression of small bronchi and cog wheel or interrupted breathing, are only of significance, like most other auscultatory signs of incipient phthisis, when they are localized over one apex, circumscribed, persistent and uninfluenced by respiratory efforts and cough. The same may be said of prolonged expiration, broncho-vesicular and vesicular breathing which occur at a later stage.

The adventitious sounds associated with an early lesion are manifold.

If the lesion has progressed no further than the form of an infiltration which obliterates the air cells, but causes little or no fluid secretion in the bronchioles or alveoli,

no râles occur and their presence is therefore not essential to a diagnosis. To wait for their appearance before arriving at a positive opinion is often as unnecessary as waiting for the presence of tubercle bacilli in the sputum. The time does not permit a full discussion of the many types of adventitious sounds which may occur.

In summary, however, it may be laid down that the crepitation is the type most frequently heard in early lesions. Characteristically heard at the end of inspiration they occasionally are rendered evident only on coughing. When localized to a limited area over an apex of the upper or lower lobes and persistent as proved by several examinations and accompanied by signs to inspection or percussion in a patient having the evidence of a toxæmia, they usually serve to identify and localize the lesion.

The outstanding facts in the distribution of adventitia in early phthisis have been well summarized as follows:

The larger the area over which moist râles are heard, especially bilaterally, the less the likelihood of their being of tuberculous origin; the higher up in the chest they are exclusively audible, the more likely that they spell phthisis; and when heard exclusively at the bases or over the lower lobes, the chances that they are tuberculous are rather scanty. (Fishberg).

One cannot leave even so short a survey of the physical signs without commenting on the pitfalls caused by the phenomena to percussion and auscultation sometimes found at the right apex in healthy people. These difficulties disappear if one does not concentrate one's attention only on the physical signs. Further food for discussion may be supplied by the study of the so-called apical catarrh following infection with organisms other than the tubercle bacillus and apical collapse associated with bronchitis.

Radiography.

There is no question that the radiographic examination of the chest has supplied us with a most valuable means of completing the examination of the physical signs. Many observers have rested too much on the X-ray plate in diagnosis and as a result in the minds of many, dissatisfaction with radiography in the diagnosis of pulmonary tuberculosis has arisen. This results from a demand that the X-ray examination should tell the whole story. It cannot. It yields the best results only when considered with the clinical evidence and the other physical signs. For this reason every clinician should educate himself to the interpretation of the X-ray plate. The information it gives to us is anatomical only. It supplies valuable confirmatory evidence in many instances of the site and extent of the lesion. It is of especial value in indicating the condition of deeper parts of the lung, information about which is often unobtainable by other methods of physical examination. It gives the best evidence of the movements of the diaphragm. In the recognition of such condition as deep seated hydatid cyst or neoplasm and especially in the pneumoconioses it is invaluable.

I may be permitted, perhaps, as a clinician to indicate what parts of the story we cannot expect the X-ray to tell us.

(i.) It does not reliably distinguish an active from an quiescent or healed lesion. (ii.) It is of no value in

prognosis. (iii.) Small areas of infiltration do not cast a shadow which is definitely recognizable.

In the very earliest type of lesion therefore, a skiagram which does not reveal any abnormal shadows is not by any means conclusive. Cohn inserted tuberculous tissue into healthy lungs of cadavers, of which he took skiagrams and found that one cubic centimetre of diseased tissue is not visible on the plate. Ziegler and Krause have investigated the problem and found that pieces of tissue less bulky than four cubic centimetres are not visible in the plate, and that, on the whole, small areas of infiltration are only visible when they are located near the surface of the lung.

Among one hundred and forty-two men suffering from simple tuberculosis of all stages found at Broken Hill, in three instances the X-ray failed to detect a lesion whose presence was indisputably shown by other means of investigation.

EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS FROM RADIOLOGICAL STANDPOINT.

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In an early case of pulmonary tuberculosis the X-ray examination, especially if screening is performed in the presence of patient's medical man, even though a definite negative or positive diagnosis may not be made, gives so much information regarding the amount of fibrosis, movement of diaphragm, illumination of costo-diaphragmatic spaces and pulmonary apices, condition of hilar glands, calcification, early caseation, position, size and shape of heart and aortic shadows that one can hardly realize in these days of modern science it being done without. Above all things I value an X-ray examination in doubtful cases of pulmonary tuberculosis as a record of untold value and if one can compare any future skiagrams with the earliest one taken, any slight alteration in the lung picture either for better or for worse is immediately picked out. Doubtful cases of ex-soldiers are examined for the Repatriation Department at six monthly intervals at the most (sometimes three) and it is very seldom then that a definite opinion cannot be given.

The outstanding objection to this method is that you are allowing the patient's condition to remain undiagnosed for a period of time most important for the man himself, if it is finally proven that it is tuberculous. However, I feel that in these very early cases of tuberculosis the clinician has so far failed and it would probably have taken him longer than three months to arrive at a definite diagnosis. With periodical radiographic examination alteration in lung tissue towards increased tuberculous infection can hardly be missed.

Stereoscopy.

Undoubtedly to obtain the fullest possible amount of information regarding the finer tissues of the lung stereoscopic films should be taken. An important distinction seen only when stereoscopic views are taken, is the relative depths of various shadows; thus a thickened pleu-

ritic patch is seen to be apart from a fibrous area in the lung and not likely to be mistaken for it. Also opaque areas can be recognized as flattened or rounded and the angles at which they run may be easily made out.

I think the most striking feature in a normal chest is the beautiful way the whole lung tissue from apices to bases becomes so much more translucent on deep inspiration. It is as though one had slowly increased the amount of X-ray light from the tube and the increased area of light due to subsidence of the diaphragm makes a picture completely different from that seen when any abnormalities are present.

A point in the early diagnosis which I consider most important is the formation in the lung tissue of circular or semicircular opacities with a fluffy edge. They do not occur in any one spot consistently, but most commonly are found between the vertebral border of the scapula and the hilum. On pathological examination they have been found to consist of a dense mass of inflammatory tissue surrounded by masses of small lymphocytes (round-celled infiltration). In later stages they go on to caseous formation.

In any film where two or three of these small patches are found with other confirmatory signs, lessening of diaphragm movement and so on, I have been in the habit of making a diagnosis of tuberculosis. Often when the patient has returned at a later date, these areas have become caseous and sometimes confluent. If, on the other hand, the disease has proceeded towards recovery, the areas become smaller and their fluffy appearance is lost, whilst their place is taken by small fine strands of fibrous tissue. Opaque rings may also be produced by pleural changes, but they can be placed in their proper plane by stereoscopic films and are usually larger and not so dense as the true pulmonary rings.

Apical Signs.

Old healed tuberculosis is a common occurrence in these areas and is recognized by a generalized increase in opacity somewhat similar to that of thickened pleura, but with more interwoven lines. If there is no active focus present the diaphragmatic movement does not appear lessened to any extent, but if the infection becomes active again an alteration in exertion of this muscle is soon apparent. In addition there is noticeably an increase in the "mottling" or "beading" and that well marked and valuable pathological sign, a "Dunham's fan," will often be made out.

Fibrosis.

The question of the fibrotic changes in the lung tissue and their effect on the amount of air intake (breathlessness), cardiac condition and pleuritic adhesions either in healed or active tuberculosis has been the subject of much comment. The coarse chronic bronchitic type of fibrosis appears to me to be of less pathological significance than the fine cob-web like type which extends further to the periphery. This latter type is found in soldiers who have suffered from gas-poisoning and in some post-pneumonic cases. Clinically it appears to be associated with very few positive signs.

In this fine type of fibrosis the amount of air intake is considerably lessened and the patient generally appears

to be very much more ill than is usual in the early stages of tuberculous disease. The amount of oxygen starvation may be so great that the patient appears cyanosed after slight exertion. If any early tuberculous condition becomes engrafted on this type of case, the heart rapidly dilates, due to extra exertion required combined with toxic absorption and the patient becomes waterlogged.

The bearing of fibrotic changes on early diagnosis of tuberculosis is important for it usually affects the whole of both lungs to a greater or lesser extent and marks to some extent the early "fans" and small collections of rounded opacities so important in forming an opinion. As Dr. W. G. Edwards has shown in the report of the Royal Commission on pneumoconiosis at Broken Hill these patients with increase of linear markings are peculiarly subject to tuberculous infection.

Hilar Gland Changes.

Increase in size of these glands occurs so commonly in chronic bronchitis, asthma, pneumonia and other conditions that unless we can detect some other sign than enlargement, I do not feel that their presence is of much significance.

Calcification even in young people does not mean a great deal beyond the fact that an inflammatory condition of some sort has been present at a previous date. Calcification is rather a good feature, unless there is any pathological pulmonary evidence at the same time pointing more to an immunity rather than to activity. However, I am quite satisfied that every now and again one comes across cases of pure hilar tuberculosis without any noticeable infection of pulmonary tissue itself. These patients show very much enlarged hilar glands which have marked "cotton wool" edges, subjective symptoms and practically nothing discernible by the stethoscope.

In the *post mortem* room how often are the hilar and mediastinal glands found enlarged from other causes, so that we must be very careful before taking too much notice of the glandular enlargement seen on X-ray films. In children the size and shape of the mediastinal area is of much greater importance.

Retro-sternal dullness may be due to fibrous tissue formation towards the mesial portion of the lung and the differential diagnosis between this and aneurysm, mediastinal tumour and hilar tuberculosis can be more easily and definitely arrived at by radiography than by any other method.

Heart Shadows.

Barjon mentions the size and shape of the heart as being of much importance in early diagnosis of tuberculosis, whilst Melville goes further and says: "the size, position and behaviour of the heart is of much greater importance than has hitherto been admitted." With the latter, I am in full agreement and for some time now have not considered a report on a doubtful case complete without a full record concerning heart and aorta. Even in the early cases the rounded outline of the normal heart is changing until in advanced conditions it appears almost as a cylindrical tube. I consider this cardiac shape to be a most important point, not only in diagnosis but in prognosis as well. The patient with an early infection and a hanging drop type of heart has a condition which will prove very

intractable to treatment, whilst a man having the same amount of pulmonary disease with a good tonic heart has every chance of recovery under treatment. This tonicity of the heart muscle and thus the shape alter in proportion to his exercise tolerance and if patients with hanging drop hearts with little exercise tolerance under careful sanatorium supervision improve, the cardiac shadow improves *pari passu*. Unfortunately, however, so far I have found that most patients relapse again as soon as they leave the sanatorium and in four or five months their hearts have renewed the atonic outline.

I have found that in persons definitely tuberculous, both radiographically and clinically (this includes all stages) the heart is bad in 50%, only moderate in 20% and good in 30%. On the other hand, with chronic type of fibrosis due either to pneumoconiosis, asthma or bronchitis in 53% the cardiac outline is good, in 27% it is only moderate and in 20% it is bad.

If we leave the intermediate figure out in both cases, that is where the heart can neither be classed as good nor bad, it is striking how the tuberculous condition affects the heart, compared with all the other inflammatory diseases that may be contracted by the lung tissue. I put these figures forward to try and show how important it is that the outline of the heart should be studied most carefully when a patient's chest is examined, for the early diagnosis of tuberculosis.

Active and Passive Disease.

One is often asked whether the lung condition is active or passive. I do not think that this very important question can be decided wholly and totally on the skiagraphic evidence alone, but it again brings out the importance of proper cooperation between the radiologist and physician. The former can show where he suspects trouble in the chest, the latter can then examine that area more carefully and their combined knowledge is, I am sure, of untold value, although separately it does not amount to anything like such a definite opinion.

The formation of "cotton wool" shadows on the edges of opacities, the furriness on the patches which so often appear, show often to be hanging from the bronchial tree, are points of importance, just as in the diaphragmatic movement and the lighting of the apices and so must be taken into account.

In certain cases there is no doubt that the radiologist can say that it is active, but even then it does not seem right to do so unless due weight has been given to the patient's condition by the physician as well as by the radiologist.

Post Mortem Examination.

In cases of early tuberculosis one can quite understand that it is very difficult to obtain under ordinary circumstances a *post mortem* examination, but during the last few years I have been able to examine three patients who died of some concurrent disease or accident. I injected the lungs with Mayer's solution which consists of a lead bichromate base.

The injection was done through the trachea and I found that the areas of the lung where tuberculosis existed were not so much injected with the solution as with those normal parts. This seemed to point out, as one would ex-

pect, that the air passages were blocked by the tuberculous material and that portion of the lung was thus not performing its ordinary function at all.

One case which was a little more advanced, showed the lower half of the upper middle lobe of the right lung to have received no lead whatsoever; this corresponded with the man's radiographic and clinical signs through life.

If you take a triangular shaped area extending from the hilum to the periphery with the apex of the triangle at the hilum, you will see that it corresponds with the enlarged "Dunham's fan" separate from the remainder of the lung by the interlobular septum at the bottom and from probably a long strong band of fibrous tissue at the top.

Negative Evidence.

An important question is whether absence of X-ray evidence can be relied on in diagnosis. I think that if consultation between the patient's doctor and the radiologist occurs and the whole subject is gone into thoroughly, the absence of pathological appearances in the X-ray film is in practically all cases of the utmost value and should be given the greatest weight.

Givvin, of the Mayo Clinic, says: "that the negative evidence obtained by X-ray has been in our experience a greater value than positive."

Of the eight hundred and fifty returned soldiers sent for X-ray examination 60% showed definite fibrosis, 35%, including those with fibrotic lungs, were originally classed as having tuberculosis of varying stages and subsequent examination showed that 28% of this 35% were more definitely tuberculous and that the diagnosis was practically without doubt, whilst I could find normal lungs in only 6%. Of course, all these men were sent from medical boards or hospitals with some clinical findings of disturbance of the pulmonary tissue.

From the above it will be seen that in only 7% was the X-ray finding not afterwards confirmed. I have left out from these calculations those patients with fibrosis who at a much later date have contracted tuberculous trouble.

EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS.

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I ESTEEM it an honour to have been asked to represent the Department of Repatriation in this discussion.

We have for the purposes of this discussion gone into the aetiology of a block of one thousand patients. The number of cases that can be described as of definite shock onset is surprisingly few. By shock onset we would refer to definite and serious illnesses or injuries occurring on war service. Definite cases of gassing, mustard gas and phosgene, have accounted for only 15% of this block. Gun-shot wounds more particularly of the trunk have preceded 8%, pneumonia and pneumonic influenza 9%, trench fever and enteric between 2 and 3% and malaria about 1%. It is interesting to note that only one blood donor claimed never to have been well since his gift and subsequently developed pulmonary tuberculosis. The total number of infections that we might say were definitely of war causation were 391 or 39%.

The remaining 609 or 61% were men who had developed phthisis with no very definite onset other than would be met with in civil life. Pleurisy and bronchitis were frequently the first signs of trouble, representing 12% in each class. Repeated colds were given by 7% as initial symptoms, which percentage also represents those in whom gradual debility and early fatigue were noticed. In 5% pulmonary hæmorrhage was the first sign of illness and 4% were influenzal in commencement. Cardiac, neurasthenic, gastric, laryngeal and nephritic onsets represented not more than 1% each. Ischio-rectal fistula occurred as a first sign in very few, seven only. Six cases were reported as being due to aggravation of pneumoconiosis and the remainder were negligible.

It is perhaps reasonable to infer from the above figures that not more than 40% of our cases were of definite war causation. The block of one thousand patients represents nearly all the Victorian patients accepted and is quite representative. The remaining 60% we must consider as probable activation of dormant tuberculosis by stress and strain of active service. One may be forgiven for suggesting on these figures that with one exception shock in the averagely healthy man does not predispose to pulmonary tuberculosis.

The one exception mentioned is that of gassing which has undoubtedly exerted a malign influence. It has unfortunately not been possible in the time at our disposal to trace all the seriously gassed men in Victoria. It was possible, however, to trace one hundred and twenty patients returned as having been seriously gassed and to follow these over five years. Of these sixty-seven have already developed pulmonary tuberculosis. This is possibly an altogether erroneous percentage, but, nevertheless, the indication is that gas poisoning has undoubtedly exerted a malignant influence in preparing a fertile soil for the propagation of the tubercle bacillus.

Clinical signs have been carefully recorded and with your permission I propose to mention those that have appealed to us as having an important bearing on early diagnosis. Taking these not altogether separately, but more or less in conjunction the one with the other we are now placing much reliance on. (i.) chest lagging, (ii.) slight subfebrile temperatures and temperature tolerance to exercise reaction, (iii.) persistent slight degree of tachycardia and pulse instability and (iv.) low tension blood pressure.

Chest lagging is undoubtedly very common and exists in 80% of our patients under treatment at the present time. It is occurring very frequently in chests that otherwise show no physical signs, and we are inclined to place more reliance in this sign than in impaired resonance to light percussion. Slight changes in resonance occur in normal chests and if one is looking for reflex bands of high pitched percussion note, it is very easy to find them in most chests. Patients who may possibly give trouble in this respect are those with pulmonary hydatid disease. Two patients have been admitted to departmental sanatoria, both suffering from hæmoptosis and showing lagging at one apex; their affections were on subsequent re-examination proven to be of hydatid origin.

Slight subfebrile temperatures have been recognized for some time as pointing to tuberculous trouble. In the diag-

nosis of pulmonary tuberculosis it is not sufficient to record the temperatures at clinical examinations. The temperature should be taken regularly over at least four weeks and until the time of the maximum daily temperature is ascertained every two hours. Even with four hourly temperature readings the maximum is easily missed.

One peculiarity of tuberculous temperatures is sensitiveness to outside impressions. Slight emotional disturbances are almost invariably reflected in the temperature chart. Instability of temperature is typically tuberculous.

The temperature tolerance reaction is a valuable one. It is our custom to send a suspect for a brisk two mile walk and to record the temperature immediately on returning and again at subsequent quarter hour intervals whilst resting. Slowness in return to normal is considered of diagnostic import.

Slight intermittent subfebrile temperatures, of course, occur in various other conditions. We have met them in neurasthenia, syphilis, *pyorrhoea alveolaris*, chronic septic tonsillitis and in early hepatic disease. The chronic alcoholic with early hepatic disease at times rather unexpectedly presents a picture resembling early phthisis. We have had several patients who have been suspected of pulmonary tuberculosis until given a course of laboratory tests and prolonged observation.

It is considered that persistent slight tachycardia and pulse instability coupled with low arterial tension are of considerable importance in diagnosis and this has been borne out by our experience. The average pulse rate of all our patients at present under treatment, taken over several occasions whilst resting, has been ninety-seven. Blood pressures of below 100 millimetres of mercury occur quite frequently. In all but 10% of our patients under treatment at the present time the blood pressure is below 120 millimetres. Fishberg considers that obscure symptoms and signs of phthisis coupled with low arterial tension are diagnostic of pulmonary tuberculosis.

Hilus Tuberculosis.

Hilus tuberculosis has in the last few years come to be recognized as a distinct clinical entity and is worth consideration in this connexion. Patients with general asthenia, irritable and unproductive cough, loss of weight and specific reactions to tuberculin tests with little or nothing in the way of chest signs have represented at least 10% of those under our care during the last few years. The frequency of the recurrence of certain physical signs in these patients has suggested the presentation of them to you for special consideration.

The first of these that may be mentioned is that of cog-wheel breathing which has sooner or later appeared in all of our patients. By cog-wheel breathing we are referring to regular rhythmic cogs and not to the irregular jerky breath sounds heard with pleuritic adhesions, irregular contractions in persons of nervous temperament. After a period in which generalized softening of the vesicular murmur was the only abnormal sign, the appearance of cog-wheel breath sounds heard best along the track of the left lower main bronchus, that is just medial to the lower angle of the scapula, was noticed. This is usually followed at a later period by similar breath sounds at the left apex. Very occasionally the apical signs have appeared first.

The fact having been elicited that the cogs were always simultaneous with the cardiac impulse, suggested the presence of a more solid body between the cardia and periphery transmitting the heart sounds and super-imposing them on the vesicular murmur. This solid body probably consists of enlarged pulmonary lymphatic glands and this sign is suggested as a valuable one in eliciting hilus tuberculosis.

With the extension of the disease cog-wheel breath sounds have been observed in a similar position on the right side, but up to the present time not at the right apex. Also with extension of the disease the character of the breath sounds at the left base have been observed to alter. Gradual softening of the breath sounds has occurred with more accentuation of the cardiac rhythm until eventually the cardiac impulse can be heard and at times felt all over this area, practically unaccompanied by breath sounds. Only one patient has been followed to termination and he died after tuberculous involvement of the inter-vertebral discs between the seventh and eighth dorsal vertebrae had been noticed. A *post mortem* examination was unfortunately not obtainable. The spinal involvement was, however, probably metastatic.

A discussion of this condition is hardly possible in a paper of this kind, but accepting Calmette's work on infection as correct, we have here a type of tuberculosis in which, owing either to increased lung resistance or else to a difference in type of infection, spread does not take place along the accepted lines. Glandular enlargement follows and extension occurs somewhat along the interlobar planes accounting for the unconventional and fleeting pleurisies met with in this particular type of tuberculosis. Rivière is inclined to think that there is a true ætiological distinction between this and the accepted forms of pulmonary tuberculosis. Certain it is that the course is extremely chronic and we have under observation at the present time a patient who has presented these signs accompanied by slight subfebrile temperatures for three years without a definite decline in health.

With chest conditions here we usually find symptoms of dyspepsia apparently due to concurrent mesenteric glandular infection. The sputum usually does not contain tubercle bacilli until eventually the lung resistance gives out. Temperatures are usually subfebrile and present remarkable regularity for tuberculous types. General malaise is frequent. Tachycardia in hilus tuberculosis is more evident and more constant than in the pulmonary forms of the disease. D'Espine's sign is practically always positive and well marked.

DR. C. B. BLACKBURN said that the cooperation of the radiologist was of very great value to the physician in the diagnosis of early tuberculosis. It had been of special value in showing how rarely early pulmonary tuberculosis was diagnosed as compared with the frequency with which relapse of old-standing lesions was encountered. It was important to differentiate between these two types. In the former the clinical evidence might be complete even to the finding of tubercle bacilli, but the X-ray evidence might be absent, while in old-standing lesions the skiagram might reveal tuberculous lesions without any clinical evidence of activity.

Many infections ended by extermination of the invading organisms, but in tuberculosis the best that could be ac-

complished was incarceration. The resulting fibrosis played a large part in what was seen in skiagrams.

Though some disorders of general health, such as anæmia, anorexia, loss of weight, dyspepsia, slight fever, were common as early evidence of tuberculosis, many persons though infected manifested no evidence of ill-health till some complication, such as hæmoptysis or pleurisy, occurred.

The difficulties in diagnosis had been exemplified in connexion with the work of the Repatriation Department; the specially high rate of pension paid to tuberculous patients had induced many returned soldiers to endeavour to show that they were tuberculous. A very large number of those applying had been found to show signs under X-ray examination suggestive of their having had tuberculosis, but no clinical test revealed evidence of activity.

Dr. J. G. EDWARDS described examination of the chest for evidence of tuberculosis as the most difficult work that the radiologist was called upon to perform. He had been rather appalled by the off-hand manner in which men made a diagnosis of tuberculosis from indifferent skiagrams. Only the very best skiagrams should be considered and any evidence of breathing during the exposure should cause the skiagram to be discarded. They rarely made screen examinations and in the last ten thousand examinations not more than 3% or 4% had been examined with the screen. Postero-anterior and antero-posterior skiagrams were secured, while the chest was held in the position of deep inspiration.

In their experience the commonest situation of onset was in the right upper region of the chest and generally close to the interlobar line. In adults they rarely felt justified in making a diagnosis of hilus or peri-tubular tuberculosis. It was necessary to exercise great care in the diagnosis of basal tuberculosis and frequent examinations should be made before catarrhal conditions could be excluded. Irregular basal shadows were frequently due to bronchiectasis or abscess. The so-called unresolved pneumonias were practically always tuberculous.

In children peri-hilar tuberculosis was seen far more commonly than apical infections. When a radiologist attempted to state that a lesion was old or recent, he was treading upon dangerous ground; let him look upon the skiagrams as showing the extent rather than the activity of the lesions.

Basal pleurisy was frequently of simple character, but apical and interlobar pleurisy was generally tuberculous. Calcification of the first rib was commonly mistaken for a tuberculous focus in the upper apices. Confusion in diagnosis between tuberculosis and hydatid disease should not occur if radiographic examination were made.

Dr. Edwards asked for an expression of opinion as to the presence of hydatid disease in spontaneous pneumothorax. He was aware that it was generally looked upon as tuberculous, but in five patients whom he had examined within a short time, no mottling had been demonstrable when the lung was expanded.

Dr. H. M. HEWLETT wished to make his remarks upon the early diagnosis of pulmonary tuberculosis by X-ray methods as practical as possible by pointing out the changes which he regarded as most important. In the first place he held that a screen examination alone was quite useless for very early infections. This should always be combined with the film examination. The screening was useful in noting the movement of the diaphragm, in comparing one with another and in observing the opening of costo-phrenic angle or any pleural adhesions. It also enabled the radiologist to make observations upon the posterior mediastinal space and the appearance of the heart shadow. Considerable attention was paid to the small central and narrow heart as it was frequently found in tuberculous patients. A good film was absolutely essential for the diagnosis of early infections. He did not regard stereoscopic films as necessary, although in some cases they were most useful. He refrained from entering into technical detail concerning the production of the film as this

would be considered in the Radiological Section. He relied upon a film made by the Potter-Bucky method, preferably with the patient in the erect position, taken postero-anteriorly in slight inspiration. Comparatively soft rays should be used so as not to obscure the fine detail which was so essential for diagnosis. Very rapid films could not be made by this method and the base of the left lung always had a blurred appearance due to movement transmitted from the heart. As this was a comparatively silent area very little harm resulted. Having obtained a perfectly satisfactory film, it was first of all examined in a general way and compared with a conception of the normal. This was a standard which must be set up by each individual worker from his experience of a large number of patients and it applied more particularly to the appearance at the hilum regions. An absolute normal was impossible to obtain as the same chest would show different appearances if examined on several occasions varying with the kind of rays used, the distance, the exposure and development. He grouped early pulmonary tuberculosis radiologically under three divisions: (i) Generalized milary tuberculosis which was very rarely seen in an X-ray department and which could be disregarded in the discussion; (ii.) peribronchial tuberculosis; (iii.) parenchymatous tuberculosis. The changes indicating a peribronchial tuberculosis were: (i.) The linear markings could be traced very far; (ii.) the involvement was greater on one side; (iii.) the distribution was in the upper half of the lung; (iv.) the linear markings showed a beaded appearance in parts; (v.) the outline of these markings was hazy and indistinct. In the parenchymatous type small nodules, varying in size from a pin's head to six millimetres in diameter, appeared in the apical region, usually in the first or second interspace. These nodules were composed of tubercles surrounded by a pneumonic exudate originating in the air cells. At first only one or two of these nodules were seen and they had a hazy outline and the linear marking going to hilum were broader and also became less sharply defined. It was this filmy, indistinct character which indicated the early lesion. When caseous, fibro-caseous and calcareous changes occurred, the nodule and linear markings became sharply cut and dense. He paid more attention to the parenchymatous nodule than to the peribronchial changes. He regarded a re-examination by the film method after an interval of six to eight weeks as most important, as very similar changes were seen in mild broncho-pneumonia, but these disappeared if they were non-tuberculous. Especially if there had been a recent influenza infection should this examination be repeated.

Dr. V. McDOWALL said in reference to examination by the radioscopic screen that in many instances it yielded very valuable evidence. At times there was a discrepancy between the clinical and radiological findings; sometimes the clinician and sometimes the radiologist detected the more extensive changes. It was necessary to exercise great care in stating that a lesion was active or inactive; only definitely and distinctly calcified areas could be regarded as non-active. The earliest radiological signs were most frequently seen above the second intercostal space. Pulmonary hydatid disease, at least in Queensland, was not a source of error in clinical diagnosis as it was rarely observed. Radiography should not be regarded as anything more than an addition to older and more established methods and was of the greatest value when employed by the clinician and radiographer in close collaboration.

Dr. W. H. STEEL said that the early diagnosis of pulmonary tuberculosis presented many difficulties; it was not difficult to suspect early tuberculosis, but to establish the differential diagnosis was a very different matter. The early diagnosis of the condition presented meant so much to the patient's domestic economy, to his future and to his relations with his family, in view of possible contagion, that every possible endeavour should be made to establish a definite diagnosis; every aid that experience and science offered, should be utilized. The early diagnosis often meant months, sometimes years, saved of persistent and

expensive treatment. He would sooner make a wrong diagnosis of early pulmonary tuberculosis where no tuberculosis existed, than diagnose no tuberculosis where tuberculosis did exist. In the first case the patient would receive treatment which would in the absence of specific treatment tend to ameliorate the condition from which he was actually suffering. Sanatoria could and should be administered so that risk of possible infection was less than elsewhere. Outside the sanatorium he would be under no increased disability. In the second case the patient had a false sense of security which might ultimately cost him his life and which would certainly increase enormously the time he would have to remain under treatment.

He emphasized the necessity of repeated examinations of selected specimens of sputum. He was of the opinion that the tubercle bacillus was discoverable in the sputum of many persons in the early stages provided the search was made thoroughly and frequently. He considered that ten examinations was the minimum number that should be made when tuberculosis was suspected. He had discovered tubercle bacilli where the sputum expectorated was less than one cubic centimetre daily of apparently watery mucus. The absence of tubercle bacilli from the sputum meant nothing towards establishing a diagnosis.

The history and the symptoms were more helpful than the physical signs. Symptoms were usually very much more definite than signs, but the age of incidence, type of case and individual characteristic influenced the clinical picture to a considerable degree.

He wished to bring under notice the early diminution of appetite and the early diminution of exercise tolerance which occurred with slight cough, sputum and some loss of weight when tuberculosis was present. It was quite easy to mistake a tuberculous condition for a gastric condition. Shortness of breath on exertion might cause them to concentrate on the patient's heart, when they should be searching his lungs or his mediastinum. The diminution of exercise tolerance usually came on gradually over a period of six months or more. It usually increased so slowly that the patient was unable to give his physician any idea of when he first noticed it. The rate at which the patient was able to work, was first slowed. Later he found that his capacity to do his ordinary work was greatly diminished. Coupled with his dyspnoea and fatigue was the nervous upset which produced an intolerance of either work or adequate rest. These symptoms were taken as an indication of the continuous mild toxæmia which was present before the disease forced itself on the patient's notice.

He had repeatedly seen patients in whom slight cough, scanty sputum, some loss of weight, loss of appetite, dyspnoea and nervousness preceded a mild attack of influenza, pleurisy or even pneumonia. The influenza, pleurisy or pneumonia failed to resolve completely and it was put down as the cause of the patient's condition. Actually these were the results of an advancing tuberculous condition. He was inclined to regard a pleurisy which failed to clear up or which recurred repeatedly, as tuberculous when other obvious conditions were not present. A tuberculous exacerbation was often diagnosed as influenza. Again influenza occurring on a slumbering tuberculous condition frequently caused the latter to become active. They should be on the look out for tuberculosis when the patient did not regain his health after a reasonable convalescence from pleurisy or influenza or pneumonia.

It was not uncommon to see a patient complaining of being run down or debilitated who was not aware of dyspnoea on exertion. An exercise tolerance test of walking fast for two hundred metres often demonstrated this dyspnoea clearly.

Chronic pyrexia did not occur frequently in early tuberculosis, but when it did, taken in conjunction with other factors, much assistance was gained in making a definite diagnosis. When pyrexia persisted for several hours after completion of two hours of the patient's usual work, tuberculosis should be considered as a possibility.

Definite physical signs often did not appear until the disease was very active and advanced. Persistent crepitant rales occurring with cough, sputum, loss of weight and marked diminution of exercise tolerance made the diagnosis certain. Areas of dullness, bronchial breath sounds and tubular breath sounds occurred in many other conditions and in themselves were therefore of doubtful value but when these areas were increasing, a condition usually very difficult to determine, their significance could not be overlooked. It was worth while examining high in the axilla for adventitia. A history of cough, sputum, loss of weight, diminished exercised tolerance, sweats and staining of sputum with blood were sufficient to make a diagnosis even in the total absence of detectable chest signs. A condition simulating tuberculosis occurred in naso-pharyngeal sepsis and chronic bronchitis, but gross diminution of exercise tolerance was absent and the patient was not so obviously toxic. It was seldom that the condition was so severe that a diagnosis of "probably tuberculosis" was made in error.

From the clinician's point of view he wished to state that the skiagram was of definite value, especially in the early stages of the disease. He was uncertain whether they could distinguish active from inactive disease from the skiagraphic appearances, but it had enabled him many times to locate adventitia which he had previously missed during repeated detailed examinations of the chest. Its greatest value was when used with other data.

The von Pirquet test might be of value in children, but it was valueless in adults, except when no reaction resulted, which seldom occurred.

The diagnostic subcutaneous injection of tuberculin was of some value, but it should be used in conjunction with the other information. Many writers doubted its specificity. He desired to obtain very definite reactions to the usual doses. These were one-fifth, one, five and ten milligrammes of Koch's old tuberculin. The temperature should be taken every four hours for a week before the test was commenced. When the slightest suggestion of pyrexial reaction occurred the increase in dosage should not be as great as indicated above. Frequent examinations should be made so that focal reactions might not be missed; he considered focal reactions to be diagnostic. The test was not without its risks even with the greatest caution. A reaction sometimes occurred which necessitated the patient being put to bed for a week, sometimes longer. This at times was productive of harm, perhaps activated a slumbering condition.

In conclusion Dr. Steel urged that they should not wait for chest signs or bacilli in the sputum or obvious signs of tuberculosis before making a definite and early diagnosis. They should also take advantage of the diagnostic assistance of X-ray and tuberculin tests.

DR. L. S. LATHAM expressed his regret that lack of time prevented the discussion in full detail by Dr. James of his extensive experience of early tuberculosis in returned soldiers. The papers submitted showed the difficulty of diagnosing early pulmonary tuberculosis by any one method.

In view of the exclusive incidence of tuberculosis in civilized communities a more important point for discussion was that of activity of lesion. Radiological and specific tests so far failed to discriminate decisively between active and inactive disease. The presence of tubercle bacilli in the sputum was sometimes noted even in an early stage of the disease and such a finding should certainly be regarded as indicative of activity.

Of physical signs crepitations had been regarded by some as occasionally occurring in fibroid healed tuberculosis, but it was assuming too great a responsibility to deny activity in their presence. Symptoms elicited by careful investigation were of the greatest value and time should not be grudged for this purpose. Reasonable assurance in diagnosis was to be obtained by the convergence of evidence gathered in different lines of inquiry.

DR. F. GUY GRIFFITHS said that there seemed to be some doubt as to what had been meant by early pulmonary tuberculosis during this discussion. They were concerned

not with pathological stages, but with clinical. The usual course of events was that infection took place from another patient by inhalation and the first lesion was an ulcer, a primary chancre, on the wall of a bronchus. From this resulted the secondary lesion in the bronchial lymph glands and later the tertiary in the substance of the lung. The primary and secondary lesions produced few or no symptoms and it was usually the tertiary which offered the earliest clinical manifestations and presented itself to the physician as early pulmonary tuberculosis. The patient was now affected, not merely infected.

As regards diagnosis by the skiagram, it should be remembered that no one ever saw anything by X-rays and that no one would ever see anything by X-rays. The human eye was insensitive to X-rays. In a photograph one saw an image comparable with that formed on the retina looking directly at an object. The skiagram consisted not of images of objects, but of numerous, variously distorted, super-imposed shadows. It was vain to attempt from these shadows to learn either the nature of the germ causing the disease or the activity of the disease. In skiascopy, however, by observing the increased trans-radiance on inspiration and the excursion of the diaphragm, a diagnosis ought sometimes be made between active and healed lesions.

Dr. Griffiths did not wish to under-value skiagraphy. It was often of the greatest importance in excluding other diseases, such as hydatid disease and in recording the progress of the case. He had had great assistance from radiography. He merely offered a warning of the difficulty of interpretation and the caution required in giving opinions.

How was early diagnosis of pulmonary tuberculosis to be made? It was by suspecting tuberculosis in every-one ill without obvious other cause. Not only when the symptoms such as bronchitis, hæmoptysis, pleurisy, suggested pulmonary disease, but also in persons with dyspepsia, languor, fever, irritability, rheumatism and slow convalescence. They should then search any sputum for tubercle bacilli and if none were found, they should test by the subcutaneous injection of Koch's old tuberculin. The von Pirquet cutaneous test was not reliable in adults. It told them sometimes of past infection; it told them nothing of activity nor of the site of the disease. A typical reaction to the subcutaneous injection told them by the local reaction at the site of injection that that infection had occurred, by the general reaction that the disease was active and by the focal reaction where the disease was. He believed that this tuberculin reaction, unlike the Wassermann test, was specific.

DR. SINCLAIR GILLIES pointed out that early diagnosis depended on the recognition of the fact that tuberculosis betrayed its presence, partly by physical signs, partly by indications of toxæmia. Often the symptoms of toxæmia preceded physical signs by long periods. Recognition of that fact was most important. Of physical signs percussion changes occurred at a relatively late period and inspection and auscultation were of greater value. The assistance offered by X-rays was of the greatest importance, but it was essential that there should be cooperation between physician and radiographer. Radiographers varied in their views to such an extent that the physician could often diagnose the radiographer as well as the lesion. He recalled a patient who had suffered an hæmoptysis, and whose chest was pronounced by the radiographer to be normal. Pneumo-thorax was induced in the right lung and the radiologist then reported the left lung as infected. The compressed lung was allowed to re-expand and as the hæmoptysis continued, the left lung was compressed and at this stage the right lung was considered to be infected by the radiographer. When both lungs had expanded, the report from the radiographer was that no lesion was found. Undoubtedly radiography was frequently of value in diagnosing a tuberculous lesion, but it must not be pushed too far.

Dr. Gillies referred to the necessity of bearing in mind the possibility of sinus infection as underlying both toxæmic symptoms and local signs in the lungs; he had records of more than eighty patients in whom sinus suppuration

was the cause of suspected tuberculosis. It was also important to remember that early diagnosis did not necessarily mean a progressive lesion. Slight changes in environment were often enough to determine recovery, so that frequently there was no need for drastic action. The possibility of subsequent acceleration should not be forgotten. He considered premenstrual rise of temperature as generally suspicious of a tuberculous lesion. Diagnosis depended not on any one sign or symptom, but on careful weighing of them all.

DR. M. MCINTYRE SINCLAIR said that in dealing with patients in whom early tuberculosis was suspected, it was advisable to take stock of three things, weight, temperature and examination of the sputum for tubercle bacilli. When bacilli were found in the sputum, doubt no longer existed. In the patient in whom chest signs persisted, and who exhibited no rise in temperature, a subcutaneous tuberculin test in accordance with Koch's directions had proved of value in his experience. X-ray examination was of much value, but the interpretation of the shadows must be made in association with the clinical history.

He preferred to rely on the clinical history and physical examination in determining the question as between activity and quiescence. He agreed with Dr. Blackburn that the X-ray examination might fail to reveal any lesion, although tubercle bacilli were present in the sputum; conversely the X-ray might reveal deep lesions not recognizable by physical signs. He had met with a number of patients with spontaneous pneumo-thorax in whom no physical signs could be found after reinflation. The patient usually reacted to the subcutaneous tuberculin test and he regarded him as probably suffering from tuberculosis.

DR. S. A. SMITH in reply said that the discussion had brought out the fact that the real problem was the recognition of the active tuberculous lesion, of affection with the tubercle bacillus rather than infection, of clinical and not pathological diagnosis. The difficulties arose from the lack of any pathognomonic sign or symptom. There were three avenues along which evidence was to be sought, toxæmia, structural changes in the lung and bio-chemical reactions. Not one of these avenues gave absolute certainty by itself. In all conditions of active tuberculosis evidence of the toxæmic class must be present. It might be slight and might appear only after close examination, but without it no diagnosis of activity should be made.

Much had been said of the inability to detect structural changes by physical signs in many instances. Though undoubtedly it was often the experience that the physician was unable to detect physical signs in suspected tuberculosis, some contributors to the discussion had not recognized sufficiently that a very careful examination, in which special attention was paid to inspection (lagging) would often locate a lesion when the stethoscope and X-rays failed. He found it difficult to believe with Dr. Griffiths that the subcutaneous injection of old tuberculin solved all the difficulties.

SOME NOTES ON TREATMENT WITH TUBERCULIN.

By L. BEDFORD ELWELL, M.B. (Sydney),
Stanthorpe, Queensland.

IN view of the recent revival of interest in the possibilities of the production of specific immunization in tuberculosis, it is well for us to realize as a profession the potentialities of the agents which are already at our disposal. I have records of one hundred and two patients treated with tuberculin for at least three months, the majority for twelve months or more, all within the last four years. In ninety-eight of these the main lesion was pulmonary. In all but three of these there was definite

evidence of more than one lobe being affected and in the large majority both lungs were obviously involved. Eight had definite cavitation. Twenty-five were ex-soldiers with a definite history of their pulmonary trouble supervening on gassing. In such cases X-ray examination has shown extensive fibrotic changes in both lungs. The diagnosis in all cases was verified either by the discovery of tubercle bacilli in the sputum or by a response to a subcutaneous injection of tuberculin. In many there were laryngeal complications; in a few joint, renal or testicular complications. The extensive nature of the disease in the majority of the patients will show that they are very far from being selected. In fact they were practically all going downhill in spite of residence in a most suitable climate and environment.

Method of Administration.

The variety of tuberculin used and the sequence of its administration has been the same throughout and in these particulars I have followed Camac Wilkinson's practice. Commencing with suitable of "P.T.O.", by gradually increasing doses one cubic centimetre was reached; then from 0.015 or 0.02 cubic centimetres of "P.T." again up to one cubic centimetre; finally from 0.2 or 0.25 cubic centimetre of "T." (old human tuberculin) also up to one cubic centimetre.

Using 0.5% phenol in normal saline solution or some other diluting fluid I make up the dilutions of every tenth; 1 in 10, 1 in 100, 1 in 1,000 and so on. The use of a syringe graduated in hundredths of a cubic centimetre makes the calculation of the dose a simple matter.

Initial Dose.

I regard the question of the initial dose as one demanding most careful judgement. As a result of my experience in order to diminish and if possible to eliminate the risk of any unfavourable reaction following the initial dose, I have endeavoured to reduce this dose to such an extent that even patients who are saturated with toxins and almost overwhelmed with them, may have the chance of reacting favourably to these minute doses of tuberculin. Following out this objective I have used dilutions up to one in ten thousand billions and from these have made up doses of one hundred thousand billionth of a cubic centimetre of "P.T.O.". Such a dose to the uninitiated may appear fantastic, but I can assure you that I have the proof that it is of a very real value. I need hardly emphasize that when many varying doses are given with the same syringe and needle, the most scrupulous toilet is necessary to avoid the risk of contamination of the smaller dose with the higher one. To simplify the recording of such doses and the labelling of the dilution I have adopted an abbreviation method.

If there is no tendency to reaction to these minute doses, the dose can be increased very rapidly by multiples of five or ten until the smallest dilutions are reached. The principle of securing the largest increase of dose compatible with the avoidance of obvious reaction has always been followed. At the same time I consider that the most valuable effects of tuberculin treatment are only seen when a certain degree of mild reaction is produced which may not affect the temperature curve at all or not more than 0.1° C. and only produced a feeling of well-being in the patient.

It is noteworthy how quite a severe reaction, such as to 39° or 39.4° C. (102.2° to 103° F.), may, when of short duration, exert a most beneficent influence on the course of the disease. Some patients date their most rapid improvement from such a reaction. It is essential that the temperature be taken every two hours or else a reaction of this nature may be entirely missed, as the temperature before and after may be approximately normal.

Results.

Of the ninety-eight patients in whom the main lesion was pulmonary, fifty-five had a complete course terminating with one cubic centimetre of "P.T." or in most cases with one cubic centimetre of "T.". All these patients were very definitely improved and in the majority a very definite arrest was secured. The period which has elapsed after the termination of their treatment is far too short to enable me to give any opinion of the permanence of this arrest. In any case I advise that they be tested at least every twelve months, if possible, for the first few succeeding years and if any lowering of their resistance be found, as evidenced by increased susceptibility to tuberculin, it is advisable for them to have a short "refresher" course. With this the full dose will be reached much more rapidly in not more than two or three months.

Of the balance of the ninety-eight patients twenty-seven are still under treatment and are all progressing favourably. The remainder who have not completed their course, include a few who have left the district or who have been prevented from attending for treatment. Nearly all of these made greater or lesser progress while under treatment. In only two instances was treatment suspended on account of the unfavourable course of the disease. In both of these patients some definite progress was noted for a time, but other factors supervened of the nature of undue physical and mental strain which materially interfered with their progress. They both developed laryngeal complications which ultimately led to a fatal issue.

Symptoms of improvement often start with the first dose; if not, they always appear within the first few weeks: a feeling of well-being, a sensation of feeling "bucked up" after each injection. That sensation may be most evident on the day following the dose or more frequently on the second day after; a slight feeling of "dopiness" may occur on the first day. If this feeling amounts to definite malaise, it may be assumed that the dose had better not be increased or only slightly the next time, even though there may be no actual febrile reaction. If the temperature is already unstable, the treatment will have the effect of stabilizing it, provided always that other factors, such as the need for adequate rest, are not overlooked.

Tuberculous subjects are nearly always prone to catch colds. An early result in the process of detubercularization by means of tuberculin is that this tendency becomes less and less evident until it practically ceases to exist. In pulmonary tuberculosis it is well known that the danger from an outside infection is a very real one, as this may lead through a mixed infection in the lungs to a rapid extension of the disease. If we successfully counter such a risk by the administration of tuberculin, we should for that reason alone, be assisting our patients materially by protecting them against their gravest danger.

Improvement of the appetite, loss of the feeling of nausea so commonly prevalent at meal time, especially at breakfast, are familiar signs of progress during treatment. Improvement in the cough and diminution of sputum are usual accompaniments.

Gain in weight is usual and may be considerable, as would be expected from the general improvement, but sometimes there is no substantial gain in spite of obvious improvement in the general condition; this does not seem to matter. When the weight is already considerably above the normal, improvement may be accompanied by a definite loss of weight. The fibrositic pains which are of an extensive and a very persistent and troublesome feature, will generally respond very well to tuberculin, though often not until the larger doses are reached. Time will permit of only a brief account of some of the patients treated.

Case I. J.S., aetatis thirty-two years, had bronchitis for sixteen years. This had been severe since an attack of influenza three years ago. He had had a tuberculous wrist at the age of eighteen months. He had been losing ground steadily in spite of twelve months of rest without exertion in the Stanthorpe district. When first examined it was found that his right wrist was greatly thickened and tender and that there were three discharging sinuses. There was a cavity in the apex of the right lung. Moist sounds were heard all over the upper lobes of both lungs. The breath sounds were grossly diminished at the base of the left lung.

Treatment was commenced with 0.000,000,001 cubic centimetre of "P.T.O.". The wrist was left on a splint which he had worn for twelve months without improvement. Eight months later all the sinuses were healed. The splint was retained for another seven months, but the rest obtained was only partial throughout, as his right arm was constantly in use. The chest signs improved well, as did his general condition. The treatment was concluded with one cubic centimetre of "T.". He was keeping well eighteen months later. His right arm was as good as his left. He had gone through the winter without a cold.

Case II. Miss L., aetatis forty-four years, had always lived in the district. She had been losing weight steadily for two years following a severe haemorrhage in spite of routine medical treatment. About one hundred and thirty cubic centimetres of sputum were collected each day; it was thick and green. She had considerable nausea and night sweats. Dyspnoea appeared on the slightest exertion. On examination fine crepitations were heard at the apex of the left lung and below the apex. Treatment was commenced with 0.000,2 cubic centimetres of "P.T.O." and concluded eight months later with one cubic centimetre. There was improvement from the start. The breathing improved greatly. The quantity of sputum was reduced to sixty cubic centimetres and it became watery. A large ischio-rectal abscess was opened during the treatment. This healed rapidly. She was still well three and a-half years later.

In surgical tuberculosis the results have been most gratifying. In one patient with an old-standing ulceration of tibia, after climatic combined with surgical treatment had failed after a prolonged trial, rapid healing with the formation of new bone was brought about by the administration of an initial dose of 0.055 of "P.T.O.", followed by as rapid an increase of dosage as the reaction permitted. This occurred in spite of the performance of arduous domestic duties with no practical opportunities for rest.

In a patient with renal tuberculosis and a history of persistent haematuria for seven years rapid improvement

was obtained by treatment following an initial dose of 0.00,005 of "P.T.O.". In six months the bleeding had ceased and the patient's health was sufficiently restored to permit him to do a full day's work involving moderate physical exertion.

In laryngeal tuberculosis improvement is often most striking, even when there is advanced trouble with cavitation in both lungs.

There are many other cases that I would like to bring before you, if time permitted, but those that I have quoted will indicate to you the potentialities of tuberculin and how the field of its usefulness can be enlarged by reducing the dose, if necessary, to the extent I have indicated. No doubt in a few hypersensitive patients it may be of advantage to reduce it still further. Since using the small doses I have found that in spite of the fact that there may be at first evidence of reaction, with a rapid increase of dose this tendency will frequently pass off and it is often possible to reach the higher doses just as quickly and in some patients more quickly than would be the case if it had been possible to give much greater doses in the first place. The advent of Professor Dreyer's vaccine may or may not mean a new era in the treatment of tuberculosis. It has yet to be proved. In any case our experience with tuberculin should be our most valuable power for good and can save many lives that would otherwise be inevitably lost. Its administration, however, demands the most careful judgement which can only be born of experience; if it is to be used successfully and safely, it is essential that such use should be preceded by instruction at the hands of an expert.

DR. T. CAMAC WILKINSON said that he rejoiced to hear that the seed he had sown twenty years before had already borne good fruit. He had to admit that the use of tuberculin in late cases was difficult and Dr. Elwell had broken fresh ground in using extremely minute doses as the initial doses. He had always said that it did not matter how small the initial doses were, so long as they were progressively increased till the final dose was one cubic centimetre of the stronger preparations or thereabouts. The test of the value of this method could only be demonstrated in a logical way, if no other method was used if the final dose was large and if after-examinations showed that the results were more or less permanent. He had recently published his records of patients all for the tubercle bacilli in the sputum, whom he had treated in 1910, 1911, 1912 and examined not three or five, but eight and ten years after treatment. These results showed that at the end of ten years not one person in the first stage of the disease had died of tuberculosis and of the patients with the disease in the second stage (Turban's classification) 67% were alive at the end of eight to ten years. The patients came from the poorest classes of society and the cost of treatment per case did not exceed £5 for a year's treatment. He challenged anyone to show any statistics comparable with these from any institution in any country in any class of society.

The treatment must be learnt at a special institution supervised by an expert. It would be dangerous to follow directions given in such text-books as Osler's and Gibson's (of Edinburgh).

Certainly the use of tuberculin in establishing the existence of active tuberculosis in an early stage, when other methods must fail, because there were no signs or symptoms in the lungs, was free from danger. Having used tuberculin as a diagnostic agent for thirty-two years in season and out of season in all doubtful or suspected cases, he had never seen any evidence of injury or a risk

of injury. It was certain that when there was active disease there was oversensitiveness or allergy of varying degrees and vice versa. The proper use of tuberculin in revealing these startling degrees of allergy, which was in fact an expression and phase of immunity, was daily becoming recognized as the only means of determining the presence of the early lesions of tuberculosis.

LETHARGIC ENCEPHALITIS.

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Dunedin, New Zealand.

LETHARGIC encephalitis is not, as was first thought when it broke out in Europe six years ago, a new disease, "morbus X" as it was called in England, but its history goes back to the very dawn of medicine. In recent years it was first described by von Economo, of Vienna, in 1917 and a year later it broke out simultaneously in London, Sheffield and Paris. Wilfrid Harris and others thought that it was a form of food poisoning or botulism, but Netter, of Paris, recognized its true character and recalled similar cases that occurred during the great influenza epidemic in 1890-1891. His description of it before the Society of Physicians of Paris still stands as the classical one, but for the earliest account of it you must turn to the Hippocratic writings. Hippocrates described the fever, somnolence and eye symptoms and he called the disease *ληθαργία*. He also described the myoclonic form and he mentioned the occasional affection of the sphincters, the great weakness without marked diminution of intelligence, the seasonal incidence in winter, the frequency of occurrence in subjects over the age of twenty-five and, most remarkable of all, he noted the beneficent effect of an intercurrent suppuration, which is exemplified nowadays in the treatment by fixation abscess. The condition was also described by Aretaeus and Galen who called it *ληθαργία πύρετοι* or lethargic fever. In the Sydenham edition of "Paulus Aegineta" one finds no fewer than fifteen references to this disease in Greek and Roman medical literature.

In modern times the first reference is found in the description of an outbreak in Tübingen in 1712 by one Camerarius who described the fever, lethargy and eye symptoms and called the disease *Schlafkrankheit* or sleeping sickness. In 1834 there was an outbreak in Dalmatia where it was called *nona* and in 1846 Dubini describes an epidemic of the myoclonic form under the apt name of electric chorea. From the commonness with which one finds cases undiagnosed now after the mass of literature that has been written about it in the last six years, it is quite obvious that many sporadic cases and even many minor epidemics must have gone unrecognized. It is obvious also that this disease, breaking out at long spaced intervals, does not entirely die out, but is handed on by carriers, *quasi cursores mortis lampada tradunt*, runners who pass on the torch not of life but of death.

The onset of the disease may be either sudden or gradual. Usually it is ushered in by headache, vomiting and nuchal pain or it may commence with violent neuralgic pains in the limbs. One of my patients had been treated for four days for acute sciatica. Again it often has a

fulminating onset with convulsions or even, when the focus is in the cortex, Jacksonian fits. In the gradual cases eye symptoms soon supervene, such as ptosis, nystagmus, strabismus, diplopia and paralysis of accommodation, or occasionally an Argyll-Robertson pupil. The patient soon sinks into a state of lethargy from which, however, he can be roused, and this may deepen into coma or may pass off and give way to restlessness or even delirium. When the lesion is low down in the bulb, eye symptoms may be missing. There may be an excito-motor condition of the skeletal muscles, choreic or athetoid movements or persistent clonic spasms, slow or rapid, which, however, do not result in much displacement of the limbs. These may be limited to one segment of the body or one limb. Occasionally single muscles, which in health never act alone, are affected, as, *exempli gratia*, the *latissimus dorsi*, which may contract without any movement of the synergic muscles. In 1918 I had a case in which the *recti abdominis* contracted regularly forty times a minute and at every third contraction the oblique muscles joined in. The case was an ambulatory one and lasted for several months, forming an interesting sideshow at the hospital during that time. The movements may persist during sleep and the muscles even when paralysed never show much atrophy. The Parkinson syndrome with muscular weakness and rigidity and with an expressionless face may come on early and then pass off, but more often it is a late sequel. In place of lethargy there may be hypsomnobia or great restlessness amounting even to a state resembling acute mania. There is usually a mild degree of fever, occasionally none and sometimes hyperthermia (40.5° C. to 44° C. that is 105° F. to 111° F.). Dysphagia, dysarthria, weakness of the tongue and facial paralysis are not uncommon. The sphincters are often affected and retention of urine was very common amongst my patients in New Zealand. Disturbances of respiration also occur in the form of polypnoea, apnoea, bradypnoea, spasmodic cough and varieties, such as sniffing, blowing through the nose, sighing and noisy respiration. Pachon explains these symptoms by the theory that there is a respiratory centre in the bulb. There should certainly be a sleep centre there, as it should be closely connected with the nuclei which supply the innervation of the eyes and lids. There is usually mental and bodily fatigue, but not as a rule marked obtundation of the faculties. The mortality is about 20% to 25%, but if all minor and unrecognized cases were included, these figures would be much lower.

From this necessarily abbreviated description it is obvious that the disease is protean in its symptomatology. Many attempts have been made to classify it into various types, but when it is remembered that the focal lesion, while having its seat of election in the mid-brain, may occur anywhere from the cortex to the *cauda equina*, it is obvious that there may be as many types of the disease almost as there are functions of the brain and cord.

The course of the disease is very variable also. It may be fulminating with death in ten days or the lethargy may last for months. The mild cases are often followed by slowly fatal Parkinsonism after an interval of one or even three years. Compare this with an infection like typhoid in which also there are many varieties of symptoms, but there is a fairly definite symptom-complex and

a natural course which the disease runs. In lethargic encephalitis there is no symptom-complex, no set course and the late sequelæ are numerous.

Of the pathology I propose to say little. It seems clearly established that the disease is due to a filtrable virus, that it can be reproduced in rabbits, monkeys and horses and that it has some crossed immunizing power with *herpes zoster*. But herpes sometimes precedes lethargic encephalitis and one case was preceded by herpes and followed immediately by varicella. No benefit has yet been derived from serum treatment.

As regards transmission there are definite instances on record where several cases have occurred in one family, where the new-born child of a mother with lethargic encephalitis has died from the disease soon after birth and also infections which have spread through institutions. King, in Lapland, traced the course of the disease from village to village and found that there was an incubation period of about ten days.

Common sequelæ of encephalitis are mental and physical inertia and especially in children moral changes, perversions, tendency to lying and stealing, nocturnal restlessness. It seems a sad reflection that morality should depend not on the higher centres, but on the animal or automatic mid-brain. In adults there may be definite psychoses even with suicidal tendency. These sequels are important from a medico-legal point of view just as the Parkinson syndrome is in the case of soldiers' pensions. Chronic tremors, chorea and athetosis may follow according to the nuclei affected, but the most common motor change is that of Parkinsonism amounting to as many as 50% in patients who had apparently recovered in the series of Pierre Marie and Gabrielle Levy. This condition is often overlooked in its early stages. The pill-rolling tremor is not usually a marked feature, but the early rigidity and muscular weakness, the fixed expressionless face which looks as if it had been turned out of a mould, the flexed arms and bent head, the fingers in ulnar spasm, the slow, monotonous voice, the absence of blinking and the gait with short steps, all make the diagnosis easy when the condition is well established. But it should be recognized earlier from weakness and rigidity and from the abolition of automatic movements, such as the swinging of the arms in walking and of the synergic circumduction of the resting arm when the movement is vigorously performed by the opposite limb. There is bradykinesia of all movements and perhaps catatonia. The disease does not rapidly spread to the lower limb and then to the arm and leg of the other side as in *paralysis agitans*, but may remain long confined to a single limb. The mask also comes on earlier.

The Parkinson syndrome may be used for retrospective diagnosis as every neurologist now sees many patients from whom a previous history of influenza with diplopia can be elicited. Other excito-motor sequelæ are chorea, hicough, facial spasm, *et cetera* and occasionally obesity, polyuria, hemiplegia and *myasthenia gravis* occur. Tinel has recently pointed out that in many cases there are sequelæ which imitate the common neuroses, that is to say patients with pseudo-neuropathic symptoms, and that raises the interesting question as to how far the common neuroses are sequels of minor infections of the brain.

This may explain the occurrence of hysterical crises, fugues, changes in temper *et cetera*, perversions and the various ties. The *locus niger* is very commonly affected in lethargic encephalitis and this probably leads to disequilibrium of the neuro-vegetative system or the centres regulating the sympathetic nervous system. As I pointed out at the British Medical Association meeting in London in 1919 there are definite reasons for supposing that reflex contracture is due to a sympathetic lesion and these further observations of Tinel may bring us a step nearer the understanding of what functional nervous disease really is.

The diagnosis is not difficult when a febrile onset, somnolence and eye symptoms are present. It may be confused with the encephalitic form of polio-myelitis, but in the latter disease the incidence is greater in summer and under the age of twenty-five and the disease reaches its height and does all its harm at the commencement, whereas in *encephalitis lethargica* the age and seasonal incidence are different and the virus continues to increase in its effects for weeks or even months. Examination of the spinal fluid will help to distinguish encephalitis from syphilis and tuberculosis and other forms of meningitis. Sometimes in encephalitis the globulin is increased without increase in cells and the latter do not show a continued and progressive rise. The absence of bradycardia and of marked dissociation between the pulse and temperature is an important diagnostic point. But it is not refinements in diagnosis that require to be emphasized. The disease is far too often overlooked when it is obviously present. In only two of my patients in New Zealand had the condition been correctly diagnosed by the attending practitioner. Unfortunately it is quite common to miss such signs as diplopia and lethargy simply from imperfect inquiry as to how the illness began. During an influenza epidemic it is easy to miss cases as the lethargy may soon give way to restlessness and graver cases are attributed to tuberculous meningitis. As illustrating difficulties of diagnosis I may mention the case of a man, aged fifty, admitted to the Dunedin Hospital with fever, lethargy and diplopia. Encephalitis was diagnosed, but it was found that he had been struck on the head with an axe handle the day before his illness began. He died in four days and the typical *manchons* of embryonic cells were found round the venules of the mid-brain. Six months later a young man from the same township was admitted with fever, nystagmus, diplopia and ankle clonus. My house physician diagnosed disseminated sclerosis. As he had pulmonary fibrosis after gassing I thought it was probably tuberculous meningitis, but inquiry showed that his illness began with sudden fever, lethargy and diplopia. I happened to mention the previous patient at the bedside when the patient said: "Oh yes, I worked in the same sawmill with him," so that there was evidently a carrier in the place. I visited this bush township three weeks later and I asked the local practitioner if he had seen much diplopia lately, when to my surprise he replied that he had seen twelve patients with diplopia in the previous three months.

With regard to treatment, I have had no success from the intravenous use of "Urotropine," autohæmo-therapy or sialogogues, all of which methods are used extensively in

France. Netter employs pilocarpine because in diseases which attack the nerve cell directly, such as rabies, mumps, polio-myelitis and lethargic encephalitis, there is sialorrhoea and perhaps salivary gland enlargement owing to inflammation of the nerve ganglia in these glands. He found further that in rabbits infected by the virus of encephalitis, pilocarpine tended to abort the disease. The fixation abscess, which can be induced by injecting a small syringe of motor spirit into the thigh, I have found useful in exactly 50% of cases and I always employ this mode of treatment. The improvement occurs just before or just after opening the abscess. This treatment was introduced by Fochier, of Lyon, in 1890 on his theory that the local focus of infection attracted the germs. This theory is no longer tenable as these abscesses are always sterile, but Mozer has lately shown that there is a large number of myelocytes in the blood when the abscess forms, indicating an increased activity of the bone marrow and perhaps a greater supply of defensive agents. For the prolonged insomnia Lust has used injections of two cubic centimeters of boiled milk or whey with marked success.

Professor J. B. Cleland and Professor D. W. Carmalt Jones read papers on this subject.

DR. A. W. HOLMES à COURT said that his intention was not to present a formal account of the disease but rather to discuss briefly the clinical features which had been observed in cases occurring in and around Sydney during the previous two to three years.

The disease could not be regarded as a rarity. Statistics from the Sydney, Royal Prince Alfred and Coast Hospitals over the period 1922-1923 recorded the admission of thirty-five patients whose illness had been diagnosed as *encephalitis lethargica*. These figures, however, gave little indication of the true incidence, because there had been without doubt many more cases of a minor grade of severity of which no accurate record was obtainable.

Of the thirty-five hospital patients, nineteen had been reported to have been relieved or recovered; in sixteen the disease had terminated fatally; eight had come to autopsy, the diagnosis having received pathological confirmation in four instances.

There could be little doubt that in the past many cases of the milder type had been regarded as influenza, although the presence of pyrexia, lethargy and transient diplopia should make the clinical diagnosis definite, provided that the possibility of encephalitis was borne in mind. Insufficient stress had been laid upon the fact that in young subjects tuberculous meningitis might be closely simulated. In older patients cerebral thrombosis or hæmorrhage, tumour and cerebral syphilis were the conditions most likely to cause confusion.

Residual ocular palsy had in certain instances simulated *myasthenia gravis*. The existence of meningeal, spinal, peripheral neuritic and choreiform types of the disease had also to be borne in mind. Moreover, as the pathological changes might be diffuse and wide spread it followed that a multiplicity of clinical types had been observed.

The occurrence of a morbilliform eruption during the febrile period had been noted and received mention in the report on infective encephalitis in England recently published by the Medical Research Council.

It was not improbable that certain cases hitherto classified as encephalitis following measles should in reality be regarded as epidemic encephalitis.

The importance of early and accurate diagnosis became apparent when it was borne in mind that evidence had been adduced to suggest that the disease might have been communicated from patients to those brought in close contact with them. The suggestion had been put forward that there might be "carriers" of the disease.

Discussion of the changes found in the central nervous system belonged rightly to the Section of Pathology. The proportion of cases in which gross hæmorrhagic lesions had been found, would appear to have been rather greater than that recorded in the publications of investigators in the United Kingdom.

At the time of speaking opinion appeared to be divided as to whether the residual symptoms so often observed and grouped under the term "Parkinsonism" were to be regarded more correctly as complications or as evidence of the persistence of the disease.

The possible latent interval between the acute phase and the occurrence of sequelæ was a very important practical point, as it might be prolonged to several months or longer. The alteration in disposition and general mental hebetude with lack of normal emotional response which not infrequently followed the acute attack, had been, perhaps, insufficiently recognized.

The treatment could not be regarded as satisfactory. It was to be doubted whether the exhibition of large doses of hexamine was of any real benefit. Treatment by production of an abscess of fixation had been advocated by certain neurologists of the French school, but could not be said to have proved a reliable therapeutic measure. When intra-cranial tension was increased, repeated lumbar puncture appeared to be indicated.

The outlook had been found to be relatively favourable in cases of the mono-symptomatic ocular type, whereas in patients exhibiting prolonged lethargy it appeared that muscular rigidity and late sequelæ would probably supervene.

Finally Dr. Holmes à Court desired to emphasize the fact that many mild cases of encephalitis occurred and frequently passed unrecognized. The possibility of the spread of infection from mild or ambulatory cases was a matter which demanded serious attention.

Dr. Keith Inglis gave a brief summary of his contribution to the Section of Pathology on this subject. His paper is included in the record of proceedings of the Section of Pathology.

DR. R. R. STAWELL said that it was clear that there was a large body of opinion to support the view that cases of *encephalitis lethargica* had occurred as a mild epidemic in New Zealand and Australia in 1919 and cases had continued to occur each winter since that date. In Australia it appeared as if the epidemic had been slightly more prevalent in Victoria than in the other Australian States.

In June, 1919, he had seen for the first time a series of cases which he was compelled to regard as a new type of disease, a type which corresponded to the description of cases of *encephalitis lethargica*. Dr. Marshall Macdonald had said that *encephalitis lethargica* was not a new type of disease in the old world. In Dr. Stawell's experience it must be regarded as a new disease in Australia, new at least in epidemic form. If it was a new disease, how was it to be recognized, upon what basis was the diagnosis to be founded. That point had been discussed that afternoon by Professor Carmalt Jones and the error in diagnosis had on the one hand been quite rightly and rather relentlessly exposed by Dr. Keith Inglis, while on the other hand, Dr. Marshall Macdonald had pointed out that the nature of the disease was frequently unrecognized. It was true both that the disease was frequently overlooked and also that the diagnosis of *encephalitis lethargica* was much too readily accepted. In Melbourne, it was a diagnosis that was being discredited as an explanation of an affection characterized by cerebral symptoms. It should be the last provisional diagnosis to be made. A correct diagnosis could only be made by the process of exclusion, for there was no known positive test, no distinctive laboratory test.

It might be said that the clinical diagnosis did not rest on a syndrome of symptoms such as fever, lethargy, diplopia, but upon the mode of onset and progress of those symptoms. It should be recognized that in the vast majority of the cases the mode of onset was acute. The

mode of onset in its broadest significance indicated the nature of the lesion. An acute mode of onset indicated an acute, inflammatory lesion. If that old clinical aphorism was always alertly applied, there would be few errors in diagnosis, such as they had heard. In addition to the significance of the mode of onset, there was the significance to be attached to the absence of papilloedema in the presence of cerebral symptoms and the absence of evident changes in the cerebro-spinal fluid in the presence of encephalo-meningitic symptoms, such as occurred in these cases. If these positive symptoms and these negative signs were considered, few errors in diagnosis would be made. Certain types of mesencephalic tumours could not be certainly differentiated from certain types of cases of encephalitis.

As regards the epidemicity of the disease, the figures in Melbourne confirmed the statistics quoted by Dr. Holmes at Court, of Sydney. The Melbourne Hospital records showed that for the first time in its statistics, cases of *encephalitis lethargica* appeared in 1919. In that year twelve patients suffering from this disease had been admitted; in 1920 seven had been admitted, in 1921 three, in 1922 twelve and in 1923 up to that date eleven, totalling forty-five patients in all. The same degree of epidemicity was noted in other hospitals in the metropolitan area. Dr. Stawell had seen many patients from the country; Dr. J. H. Downing, of Kyneton, Victoria, had published in THE MEDICAL JOURNAL OF AUSTRALIA of July 6, 1919, a case entitled "Coma following Influenza." This appeared to have been a case of *encephalitis lethargica*, the first recorded in Australia.

In Dr. Stawell's experience the infectivity had not been of a high degree of virulence. He had not been able to trace the source of the infection in any case, though many such occurrences had been recorded. Many cases had occurred in close association with influenza and if the name *encephalitis lethargica* had not been adopted, they would have been forced to adopt a term like *influenzal encephalitis* to describe this condition.

In reviewing his past experience before the epidemic of 1919, Dr. Stawell thought that he had seen "sporadic cases" of the same disease which he had labelled *encephalitis*.

He had only seen a few *post mortem* examinations on persons dead of this disease, though he had seen in private and in consultation practice and in civil hospitals and military hospitals about one hundred patients in four and a half years.

He had recently seen a patient who had died in the Melbourne Hospital with the classical macroscopical appearance in the brain and the microscopical section showed the inflammatory changes indicative of the disease. Professor Cleland had seen the microscopical sections and was of opinion that the change was characteristic of *encephalitis lethargica*.

Of all the manifold problems of prognosis, of the problems of residual symptoms or of progressive sequelæ he would not speak, but would express the opinion that the disease *encephalitis lethargica* was present in Australia as a definite entity, separable from X-disease and separable from polio-encephalo-myelitis.

For the further investigation of the disease and for the hope of some effective antidotal treatment, work would have to be done along the lines so splendidly laid down and followed by Professor Cleland and Dr. A. W. Campbell in the investigation of "X-disease."

DR. KEITH INGLIS stated that during the past three years *post mortem* examinations on eight bodies of persons who had suffered from a disease clinically regarded as *encephalitis lethargica*, had come under his notice. The majority of these examinations had been performed by himself. In only one of them was the histological picture similar to that described by European and American observers as occurring in *encephalitis lethargica*. In this one the ring of

lymphocytes and plasma cells around the venules, the oedema and the small hæmorrhages were conspicuous features. In the other cases death had been due to a variety of causes. In one instance a large cerebral hæmorrhage was present, in another a glioma; a third showed septic encephalitis probably due to septic infarction. In the brain of a boy, fifteen years of age, a circumscribed tumour filled with blood had been found in the *pons Varolii*. This was regarded at first as an aneurysm, but after more careful consideration it was thought to be a neoplasm; apparently it had ruptured, for extravasated blood had been found in the ventricular system. In a young child partly organized blood clot had been present at the base of the brain and extending down the cord; though this blood-clot was intimately associated with the pia-arachnoid and not the *dura mater* the appearances resembled those seen in *pachymeningitis hæmorrhagica interna*, a condition recently reported in America as sometimes occurring in infants and regarded as not necessarily syphilitic. In an adult who had suffered from epileptiform attacks during life, atrophy of some of the convolutions on the vertex of the brain had been found, but the histological picture of *encephalitis lethargica* had not been present. Similar absence of histological confirmation had been observed in the brain of a girl who during life had presented choreiform signs and symptoms. Dr. Inglis admitted that in those cases in which no gross lesion had been found after death, the failure to detect histological evidence of encephalitis may have been his fault; still gross lesions were found often enough to show that the discrepancy between clinical diagnosis and *post mortem* findings was not inconsiderable. He paid a tribute to Professor Cleland, Dr. Campbell, and Dr. Burton Bradley for their work on "X-disease" and pleaded with the clinicians to invite pathologists to cooperate with them along similar lines in the study of *encephalitis lethargica*.

DR. HENRY LAURIE stated that comparatively little had been said in the discussion about prognosis in epidemic encephalitis. It could not be too clearly insisted upon that prognosis did not end with the initial attack. Months or even years after seeming recovery from an attack of *encephalitis lethargica* sequelæ might develop, usually taking the form of symptoms of the Parkinsonian syndrome denoting progressive degeneration of basal ganglia. In this connexion he quoted two cases. The first was that of a man twenty-eight years of age, who after suffering for two days with diplopia which was more subjective than objective, had been seized quite suddenly with severe clonic spasms of all four limbs, the so-called myo-clonic type. He would not elaborate his symptoms, lethargy, fever and so on. He had been confined to bed with this attack for four weeks. From this he had slowly recovered, the only defect having been some slight slowness of cerebration. A few weeks prior to the Congress he had walked into Dr. Laurie's consulting room and a mere glance had revealed the condition. His gait had been slow with some bending forward and his whole body had been held rigidly. His face had been mask-like with non-blinking eyes and there had been slight tremor of his right hand when at rest.

The second case was that of a child aged eight years whom he had been asked to see in the children's ward of the Alfred Hospital. The history obtained was that two years previously the child had been in hospital with a severe attack of "sleeping sickness." Recovery from this was said to have been complete. The child had returned to school and had been able to take his part in games with others of his age. When seen a day or two before his death he had been emaciated, lying on his side in bed with his legs drawn up tightly. There had been intense rigidity of all limbs and resentment when they had been moved. There had been no actual contractures and no spasticity. There had been an extreme degree of paresis, but seemingly no actual paralysis. The facial muscles had also been rigid and the face expressionless even when the child was made to cry by efforts to extend the limbs. The cry also had been

without expression. Altogether the patient had exhibited a condition comparable to that found in the last parietic stages of typical *paralysis agilis*.

These cases showed well what Dr. Holmes & Court had called the latent period in this disease.

Dr. Laurie asked whether the condition was a late phase residue or a sequela of the actual encephalitis. He preferred the latter term as the secondary stage did not necessarily conform to the type seen in the primary attack.

Another point has been raised in the discussion. Was this a new disease? He agreed with Dr. R. R. Stawell that it was new to Australia; no recognizable cases had been reported here prior to the present pandemic.

It was not, however, a disease new to the old world. In the fourth edition of Church and Peterson's "Textbook of Nervous and Mental Diseases" published, in 1903, there was described under the heading of acute hæmorrhagic encephalitis an epidemic which occurred, especially in southern Europe, seemingly as an aftermath of the influenza pandemic of 1899-1901. The description there given both of the symptoms and pathological findings agreed almost entirely with those found in the present epidemic. There might be found the sudden acute onset, the evanescent changeable pareses especially of the ocular muscles, the small or large hæmorrhagic patches in the brain tending in many cases to be most frequently found in the basic ganglia.

Dr. THOMAS FIASCHI wished to corroborate the observation of Dr. Macdonald that the fixation or artificial abscess resulted in benefit. He had attended two patients with epidemic encephalitis in Sydney two years previously and in both he had created an artificial abscess by the injection of 3.5 cubic centimetres of spirits of turpentine in the outer aspect of the thigh. Both patients had exhibited remarkable improvement after the abscess formed and recovery followed.

Dr. F. R. LEGGE recalled an epidemic of acute poliomyelo-encephalitis which had occurred in his district at the time of the Broken Hill "X-disease." There were thirteen residents affected. The first was a child, thirteen years of age, who was stated to have had infantile paralysis years before. The right leg had been paralysed and atrophic. She had been admitted to hospital with an attack of varicella, but in a very brief time her general symptoms had become worse, mental symptoms and the palsies of acute poliomyelitis had developed. The illness had terminated fatally. The case of this patient was of interest in connexion with the remarks of Professor Cleland and also from the point of view of immunity conferred by an attack of poliomyelitis.

PROFESSOR A. E. MILLS said that he wished to confirm the opinions expressed by Dr. Stawell and by Dr. Sewell regarding the diagnosis in epidemic encephalitis. He agreed with Dr. Stawell that the disease was new in epidemic form, but he was also inclined to the view of Dr. Sewell that examples formerly seen had remained undiagnosed or had been regarded as tuberculous meningitis.

The question of lethargy was to be considered from two points of view. It could be produced as a result of toxæmia affecting the cortical cells or as the result of an inflammatory condition of the cortex with attendant oedema. Lethargy might also be connected with a great increase in cerebro-spinal fluid and consequent raised intra-cranial tension. What would cause such an increase in the amount of cerebro-spinal fluid? He suggested that in *encephalitis lethargica* the brunt of the infection fell on the chorioid plexus. If such were the case, there would be an explana-

tion for those numerous instances in which a great and persistent excess of cerebro-spinal fluid was present.

This raised another question. It was undoubtedly a fact that papilloedema was rarely observed in *encephalitis lethargica*, but in occasional cases where the cerebro-spinal fluid was in excess and was not withdrawn, papilloedema might follow. Professor Mills related the case history of a child, aged six months, whom he had seen many years ago. The diagnosis made was that of tuberculous meningitis, but he had since realized that the clinical features were much more consistent with *encephalitis lethargica*. The child had been lethargic for weeks, had suffered from repeated convulsive attacks, had developed signs of encephalitis and later papilloedema and optic atrophy. Hydrocephalus had been very pronounced, but it had not been due to blockage of the foramen of Majendie or the lateral recesses, for lumbar puncture had relieved the pressure, so that bulging of the fontanelle had given place to depression. The child had recovered but his intelligence had been definitely impaired.

Dr. W. OSTERMEYER referred to the third nerve involvement and lethargy considered characteristic of lethargic encephalitis and cited the case of a patient who had exhibited these features in typical form during an epidemic, but in whom the exact pathological condition had been shown by *post mortem* examination to be a cerebral tumour. This patient's eyes had been examined twice early in the course of the disease and no optic neuritis had been detected. The cerebro-spinal fluid had been clear; there had been no vomiting and very little headache. A latent frontal tumour had occasioned some homolateral tremor that might have helped the diagnosis during life; the optic neuritis that was apt to develop very late in the course of a frontal tumour, had not been available at the time the fundi had been examined, though it had doubtless supervened at a later stage.

Dr. OLIVER LATHAM said that he wished to endorse the remarks of Professor Cleland. He would be very interested to know what the specific histological differences were that enabled Dr. Simon Flexner to recognize the poliomyelo-encephalitis group from *encephalitis lethargica*.

He had for several years past been called upon to examine brains from patients suspected of having died of *encephalitis lethargica* and had found that sections hand-cut by the frozen method, affixed by celloidin to a large slide after formol-alcohol fixation and stained by Nissl's method gave the clearest picture. The general reaction in the venous system of cord, medulla, brain-stem and basal ganglia seemed very similar in any of the groups in which were included general paralysis of the insane, trypanosomiasis, "X-disease" or encephalitis. The histological picture in all these conditions depended chiefly upon the duration of the infection. In acute *encephalitis lethargica* lasting up to three weeks the main lesions appeared to be (i.) vascular engorgement of the pons and brain-stem, (ii.) "cuffing" of the blood vessels, (iii.) death of nerve cells. The nerve cells died sometimes in groups, but sometimes singly over large areas; the cells showed swelling, displacement and disappearance of the nucleus, alteration in the shape of the cell and its processes, and a most distinctive neurophagia. Endothelial proliferation and the appearance of early neuroglial cells called *Stabzellen* were also noted.

Dafano had noted the extraordinary quickness with which brains of artificially infected rabbits showed evidence of an inflammatory reaction throughout the whole brain and brain stem; this had its parallel in the acuteness of the onset and wide spread nature of the reaction in the human subject.